Assessment

Forest Plan Revision

Final Socioeconomic Report

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for:
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Social and Economic Conditions

Introduction

A draft of this report was released for public review on November 30, 2016 and feedback was requested by January 6, 2017. Changes made to the final report based on public feedback were to add information about the employment contributions of the Custer Gallatin National Forest.

Social and economic conditions surrounding the Custer Gallatin National Forest are described in this report, along with a detailed assessment of Custer Gallatin National Forest contributions to social and economic sustainability including direct benefits to people, and communities at risk.

The preamble of the 2012 planning rule for National Forest System land management planning recognizes that ecological, social, and economic systems are interdependent. As such, the planning rule requires the consideration of social, economic, and ecological factors in all phases of the planning process. The rule also recognizes that, though national forest management can influence social and economic conditions relevant to a planning area, it cannot ensure social and economic sustainability because many factors are outside the control and authority of the responsible official. For that reason, the planning rule requires that plan components contribute to social and economic sustainability within Forest Service authority and the inherent capability of the plan area. Specifically, the planning rule defines sustainability in the following ways (§ 219.19):

- ‘‘Ecological sustainability’’ refers to the capability of ecosystems to maintain ecological integrity;
- ‘Economic sustainability’’ refers to the capability of society to produce and consume or otherwise benefit from goods and services including contributions to jobs and market and nonmarket benefits; and
- ‘‘Social sustainability’’ refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities.

Process and Methods

This chapter presents socioeconomic and land use information for the Custer Gallatin areas of influence. The directives define the area of influence as “where the management of the plan area substantially affects social, cultural, and economic conditions” (Forest Service Handbook 1909.12, section 13.21). This information provides context for understanding the setting of the Custer Gallatin, the forest visitors and stakeholders, and the social and economic demands that influence forest management on the Custer Gallatin National Forest.

While economic and land use information is reported at the county level, demographic data are reported at smaller geographies, the Census County Division level. Census County Divisions are delimitated by the U.S. Census Bureau, in partnership with local authorities, and are used as proxies for communities in social assessments (Crandall et al. 2014). Census County Division names are based on a well-known population center, place, or geographic feature. They are intended to be easily identifiable by local community members. Recognizing differences in these data and geographies, two unique areas of influence are presented in the assessment.

For economics, the area of influence comprises 15 counties, highlighted in Figure 1. These counties were deciphered as part of the analysis area using a consistent, defensible and appropriate method

(METI and EIC 2010), which has been applied across the National Forest System (Ecosystem Management Coordination, 2016) to perform contribution and impact analysis.

Following this method, an initial selection of counties is accepted as those having Custer-Gallatin National Forest lands. Additional counties are added through analysis of direct national forest expenditures. Specifically, this means counties identified with more than 5 percent of the total national forest business activity in either grazing (based on permittee locations) or forest management (based on timber bid winner locations) are included. For recreation influences, counties identified within the Custer Gallatin's 50 percent market area (yielding 50 percent of all surveyed visitors), as defined by the National Visitor Use Monitoring Survey, are included. A final analysis identifies the existing labor shed as described in 'USDA Forest Service Protocols for Delineation of Economic Impact Analysis Areas' (METI and EIC 2010), and tests remaining counties for a sufficient share of the total labor market. A substitution to this methodology includes Big Horn County in Montana, which is selected based on potential for environmental justice risks including a combination of high poverty, high minority population, and adjacency to the National Forest.

Counties not selected in the final economic area of influence include Yellowstone County of Montana, and Lawrence county of South Dakota. Though connected by resource trade-flows, these counties do not meet thresholds for direct expenditures and labor shed influence from the Custer-Gallatin National Forest.

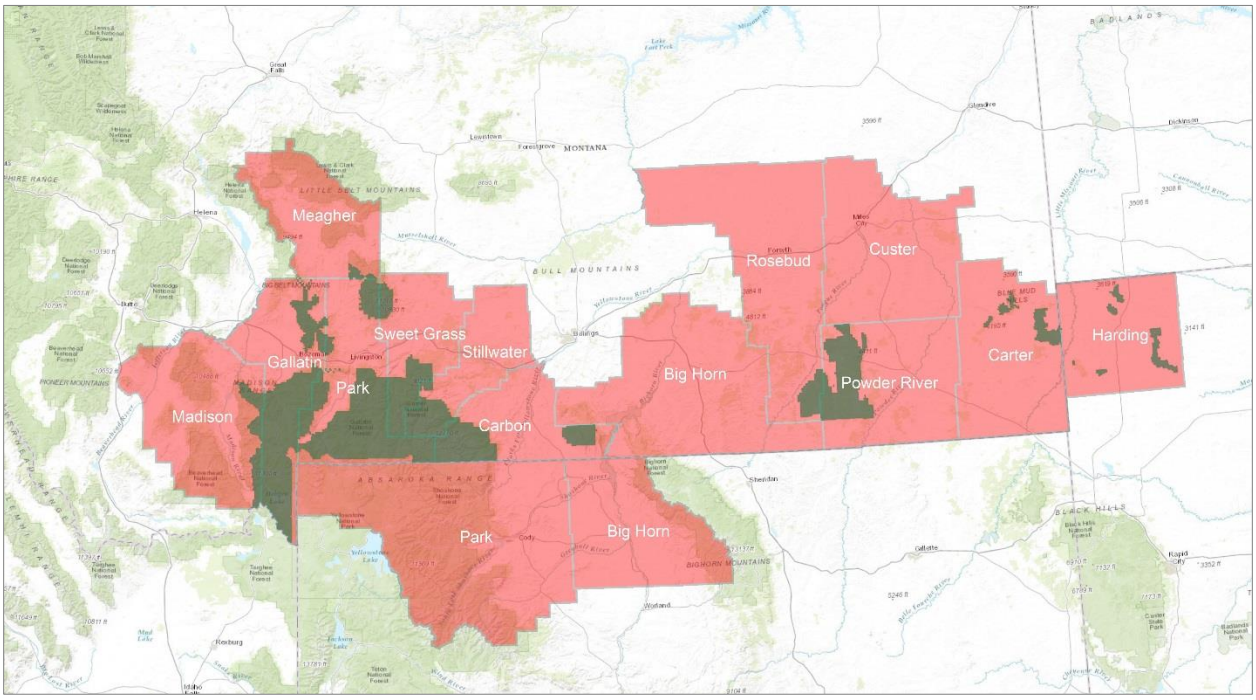

Figure 1. Counties included in the economic area of influence

In the case of the social analysis, the area of influence is defined by both geography and social ties. For the social area of influence, all Census County Divisions within 50 miles of the forest are included. The 50-mile distance threshold is commonly used to approximate areas of social influence as it represents approximately a one hour's drive to the forest. This is a reasonable distance for one to travel on a weekly or even daily basis, either for recreation or for commuting purposes. Additionally, the bulk of forest visits, over 2 million, (approximately 67 percent of total visits) to the Custer Gallatin National

Forest, according to 2010-2014 National Visitor Use Monitoring Survey data, were from people living within 50 miles of the forest. Figure 2 shows the Census County Divisions included in the social area of influence.

Applying the 50 miles distance threshold, 231 Census County Divisions fall within the social area of influence. This large geographic analysis area represents those communities where traditions, cultures, and activities connect people to the Custer Gallatin National Forest. It is important to note that not all 231 county sub-divisions included in the social area of influence have similar or equal ties to the forest. Certain areas are far more closely linked than others and each enjoys a different mix of benefits. In the social assessment, data are provided to lend insight into which specific benefits are most valued by particular communities within the social area of influence. Section 13.23 of the directives state "Social, cultural, and economic conditions in the area of influence that are neither sensitive to, nor affect, the management of the plan area may not merit further detailed analysis in the planning process. The assessment should identify the social, cultural, and economic conditions that are sensitive to the management of the plan area." As such, this assessment will focus on those conditions most relevant to forest planning.

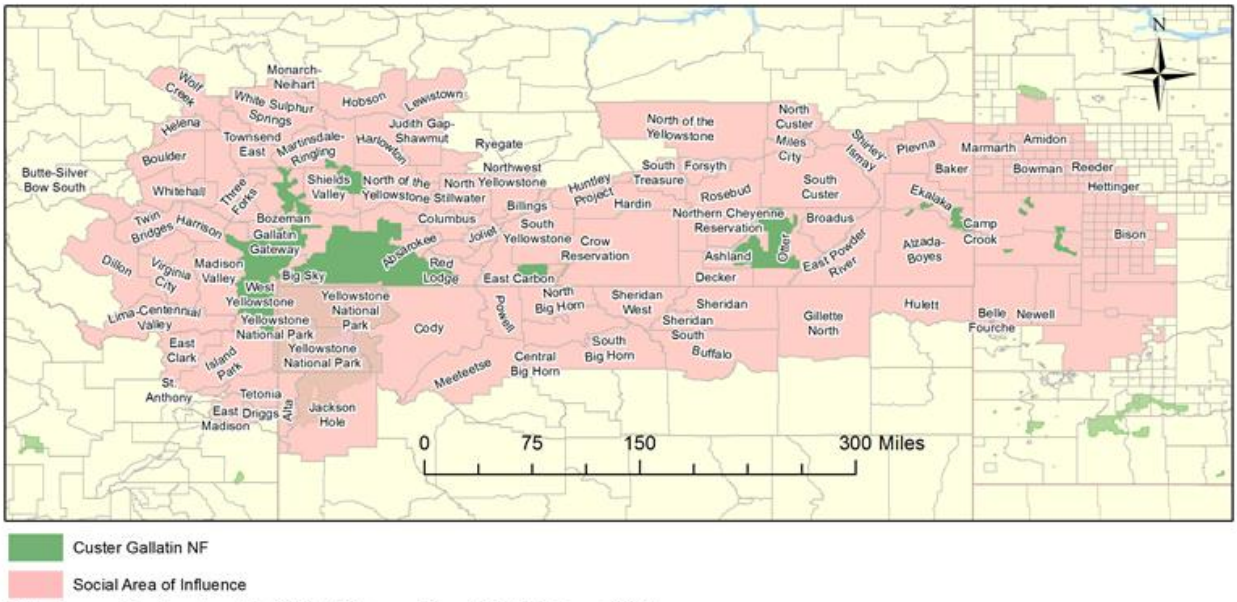

Figure 2. Census County Divisions included in the social area of influence (AOI)

While distance thresholds are commonly used in the social assessment literature to define the area of influence, Endter-Wada and Blahna (2011) advocate for a more holistic approach, taking proximity, local knowledge and forest linkages into account. They posit that communities should be selected based on how closely they are linked to public lands, not simply how close they are located to forest boundaries. For example, communities that commonly use the forest for recreation and where grazing permit holders and timber bid winners are located, should also be included, even if those communities are not adjacent to forest boundaries or within a defined distance threshold.

Figure 3 shows the locations of timber sale bid winners (2010 to 2016) and grazing permit holders. The majority fall within the social area of influence, buttressing the justifications for the 50-mile boundary.

While the social area of influence contains 231 county sub-divisions, spanning 46 counties, the majority of Custer Gallatin National Forest lands fall within 11 counties (Figure 4): 10 counties in Montana (Meagher, Madison, Gallatin, Park, Sweet Grass, Stillwater, Carbon, Rosebud, Powder River, Carter) and Harding, South Dakota. County growth policies (comprehensive plan for Harding County, SD) were reviewed to identify the key benefits of the Custer Gallatin National Forest that county constituents rely on and/or hope to expand in the future

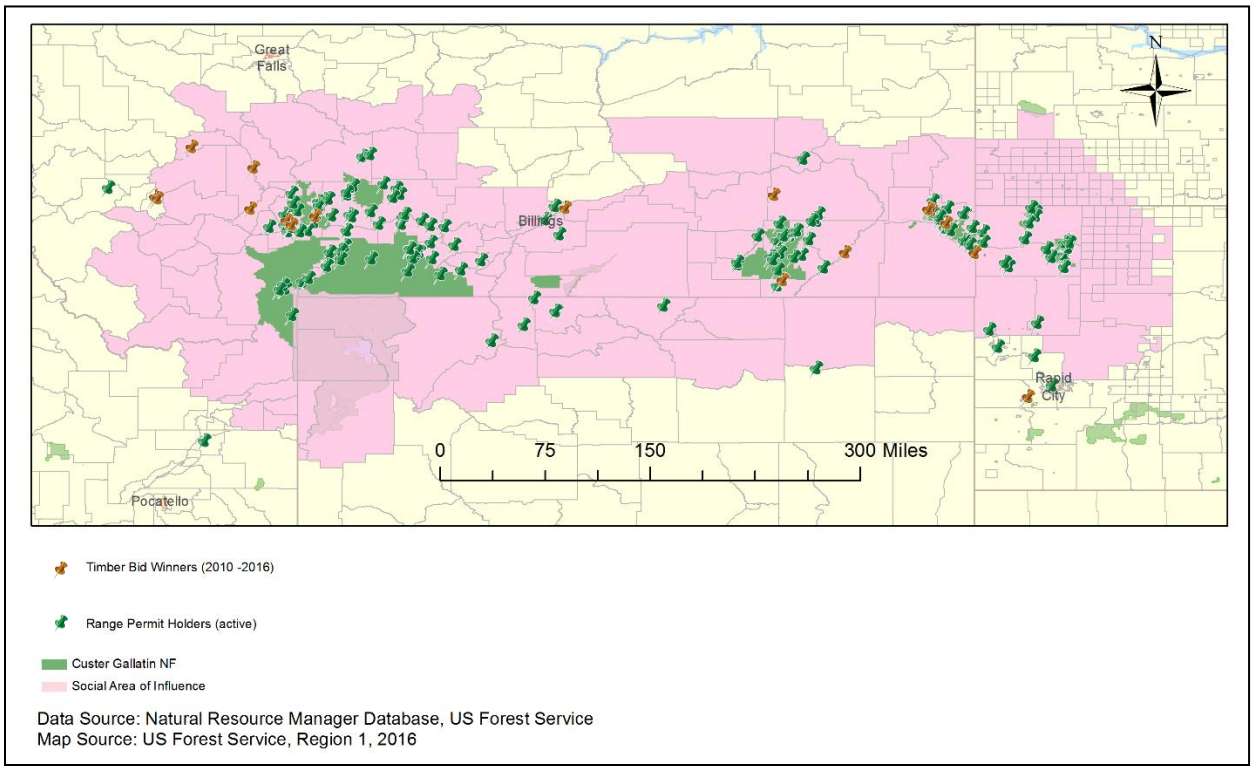

Figure 3. Timber bid winners and grazing permit holders

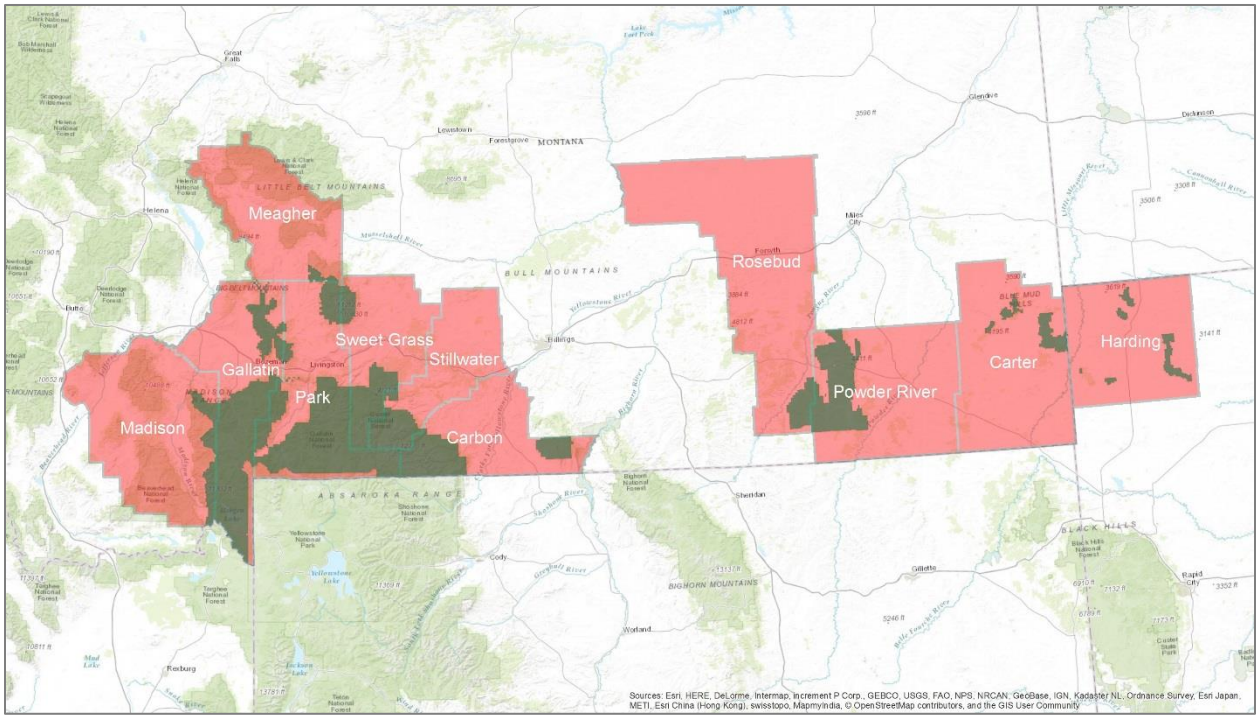

Figure 4. Eleven counties with growth plans intersection Custer Gallatin National Forest lands

Scale

This analysis takes assessment of social and economic conditions in respective Custer Gallatin areas of influence. Contributions from the Custer Gallatin to the broader landscape, including national and global stakeholders, are also considered. The scale of the broader landscape is dependent on the given benefit in question. For example, those who benefit from the existence of wilderness, even if they never plan to visit (Kline and Mazzotta 2012), are considered when examining the inspirational benefits of wilderness areas in the Custer Gallatin. Social and economic conditions, as well as forest benefits (when data are available), are also categorized by the five landscape areas:

- Madison, Henrys Lake, Gallatin, Absaroka and Beartooth Mountains
- Bridger, Bangtail, Crazy Mountains
- Pryor Mountains
- Ashland District
- Sioux District

Existing Information Sources

Information on the social environment is provided, at the sub-county division level, from the American Community Survey, 2010 to 2014 dataset, United States Census. The American Community Survey data are commonly used to assess the social conditions of communities. Where sub-county data are not available, county-level data are provided from federal data sources accessed through the Economic Profile System (Headwaters Economics 2016) and the University of Wisconsin Community Health Rankings (County Health Rankings and Roadmaps 2015). Data on services the Forest Service provides are obtained from the Natural Resource Manager database of the U.S. Forest Service. These data

include grazing permits, timber contracts, educational programs, partnerships and volunteer program participants. A review of county growth policies was also conducted and relevant information was incorporated into the existing conditions discussions. Data on social and economic contributions were also obtained from discussions with Forest Service employees. These data were also incorporated into the discussion of the existing conditions.

Information on the economic environment is provided from multiple sources. Much of the information contained in this report was taken from the Economic Profile System – Human Dimension Toolkit (EPS-HDT) developed by Headwaters Economics (EPS-HDT 2012) in partnership with the Bureau of Land Management and the U.S. Forest Service (http://headwaterseconomics.org/tools/eps-hdt). EPS-HDT is a free software application that runs in Microsoft Excel and produces detailed socioeconomic reports of communities, counties, states, and regions, including custom aggregations and comparisons. EPS-HDT uses published statistics from federal data sources, including, but not limited to, the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Census Bureau. Other economic information is sourced from IMPLAN software from MIG Inc. IMPLAN compiles industry data across the U.S. and provides region-specific information.

Other significant sources of information used for this report included publications on Montana's forest products industry developed by the Bureau of Business and Economic Research, Northwest Economic Development District publications, county growth policies and plans, data from Forest Service programs, salary and non-salary expenditures, and employment from Forest Service corporate databases. Specifics on these and other sources used in the development of this report can be found in the "Literature Cited" section.

Current Forest Plan Direction

The 1986 Custer Forest Plan addressed "Rural Community and Human Services" in two ways. First, "the Forest will provide direct and indirect employment opportunities through personnel programs and through jobs created by user groups as they utilize National Forest resources. The Forest will increase opportunities for minorities, senior citizens, the handicapped, and the disadvantaged to enjoy the National Forest. The Forest will work with Job Services and educational institutions in Montana, North Dakota, and South Dakota to utilize programs such as CETA, Work Study, and others. The Forest will emphasize the volunteer program for the dual purpose of work accomplishment and the training and experience." Second, "the Forest and Ranger Districts will continue contacts with tribal governments to identify opportunities for lending assistance. As needs arise, the Forests and Districts will support tribal government's efforts to develop and manage their natural resources".

The 1987 Gallatin Forest Plan provided no specific direction on community conditions. Instead the plan is focused on providing a suite of benefits to forest users including recreation opportunities and access, scenery, clean water, cultural resources, timber, minerals, grazing, fish, wildlife, water quality, wilderness, wild and scenic river and fire protection. There is no explicit mention of supporting communities directly. Instead, the focus of the plan is on those specific benefits the forest provides to users. Under the management guidance, a summary of benefits the public is most concerned with are described:

> "Many people see the Forest as being very important in their lives. At public workshops people have said that activities such as hiking, camping, picnicking, hunting and fishing, snowmobiling, trail biking, skiing, and firewood gathering are significant to them. Watersheds, big game, livestock, minerals, oil, gas, and timber are resources which people have identified as important to them." (Gallatin Forest Plan)

Existing Condition

In this section, the social and economic conditions of the areas of influence are described in the context of forest planning. First, a description of population demographics are provided including population size, change, age, and urbanization levels. Environmental justice populations are also identified. Next, indicators of social and economic sustainability of communities are provided. These are split into three main categories: well-being, health and safety and traditional/cultural/spiritual values.

Lastly, relevant contributions of the Custer Gallatin National Forest to social and economic sustainability are presented and discussed in the context of social and economic conditions, other impacts (risks and stressors), and the broader landscape. The central purpose of this section is to answer three key questions:

1. What are the key benefits of the Custer Gallatin National Forest?

   A key benefit is one that a) contributes to social and economic sustainability and b) may be influenced by the forest plan.
2. What social and economic conditions might be impacting these key benefits of the Custer Gallatin National Forest?
3. What other risks, stressors and conditions (for example, broader landscape, climate change, conflicting benefit, etc.) might be impacting these key benefits of the Custer Gallatin National Forest?

It is important to note that a full discussion of all social and economic conditions, and all the benefits of the Custer Gallatin, is well beyond the scope of this assessment. The goal is to only provide information that is directly relevant to the planning process. Relevance is determined by whether or not the information provided will inform decisions around developing plan components and/or understanding impacts of a proposed forest plan and alternatives under the National Environmental Policy Act process.

Demographics

Population Size, Change, Age and Urbanization Rates

The population demographics of the area of influence are important to understand. If populations are changing significantly, there may be changes in the demand for given benefits from the Custer Gallatin National Forest. For example, a population spike in urban areas could signify a rise in demand for recreational opportunities on the forest. An aging population could indicate an increase in demand for more developed recreation. A decrease in the rural population could signal a decrease in rural lifestyle values, and decreased demand for grazing. If racial/ethnic minority communities or low-income communities are present, that may be environmental justice concerns.

As of 2010, the most recent decennial census year, the total population in the social area of influence was approximate 590,000. The population is the social area of influence is not evenly distributed across the landscape. 12 county-sub divisions (see Table 1), each with a population of 10,000 or more, contain 63 percent of the population in the social area of influence.

Table 1. County-sub divisions with population of 10,000 or above

Census County Division (CCD)	Population
Billings CCD	107,934
Helena CCD	54,095
Bozeman CCD	49,560
Gillette North CCD	30,768
Belgrade CCD	23,200
Sheridan CCD	21,451
Jackson Hole CCD	20,669
Laurel CCD	15,847
Cody CCD	15,648
Livingston CCD	12,325
Powell CCD	11,257
Miles City CCD	10,544

Figure 5 shows the population distribution. It is clear that the bulk of the populations in the social area of influence are located around Belgrade, Bozeman, and Livingston. Population centers relatively close to the Ashland District include Sheridan and Gillet, WY and Miles City, MT.

The changes in population across the area of influence are also unevenly distributed across the landscape. Between 2000 and 2010, the bulk of the population growth occurred around the Gallatin, Bridger, and to a lesser extent, the Ashland District (see **Error! Reference source not found.**). Communities surrounding the Sioux District and the Pryor Mountains lost population over the same period. Communities in orange and red gained population between 2000 and 2010 while communities in yellow, green and blue lost population.

According to 2010 data, 58 percent of the population live in urban areas and 42 percent live in rural areas. Between 2000 and 2010, the population increased by 19 percent, however, the urban/rural divide stayed constant (see Figure 7). This suggests that although there has been a significant increase in population, the mix of urban and rural lifestyles has stayed relatively constant over the decade. So, while the demand for benefits from the Custer Gallatin is increasing, the proportion of people who desire traditional, rural lifestyle benefits, such as grazing and access to hunting, fishing and other recreation, has likely stayed relatively constant.

Several communities did experience substantial changes in the proportion of people in urban versus rural areas. Belle Fourche-Cheyenne Valleys, Belle Fourche City, Billings, Hardin, Lewistown, Miles City are all predominantly urban communities, yet added more rural residents in the last decade.

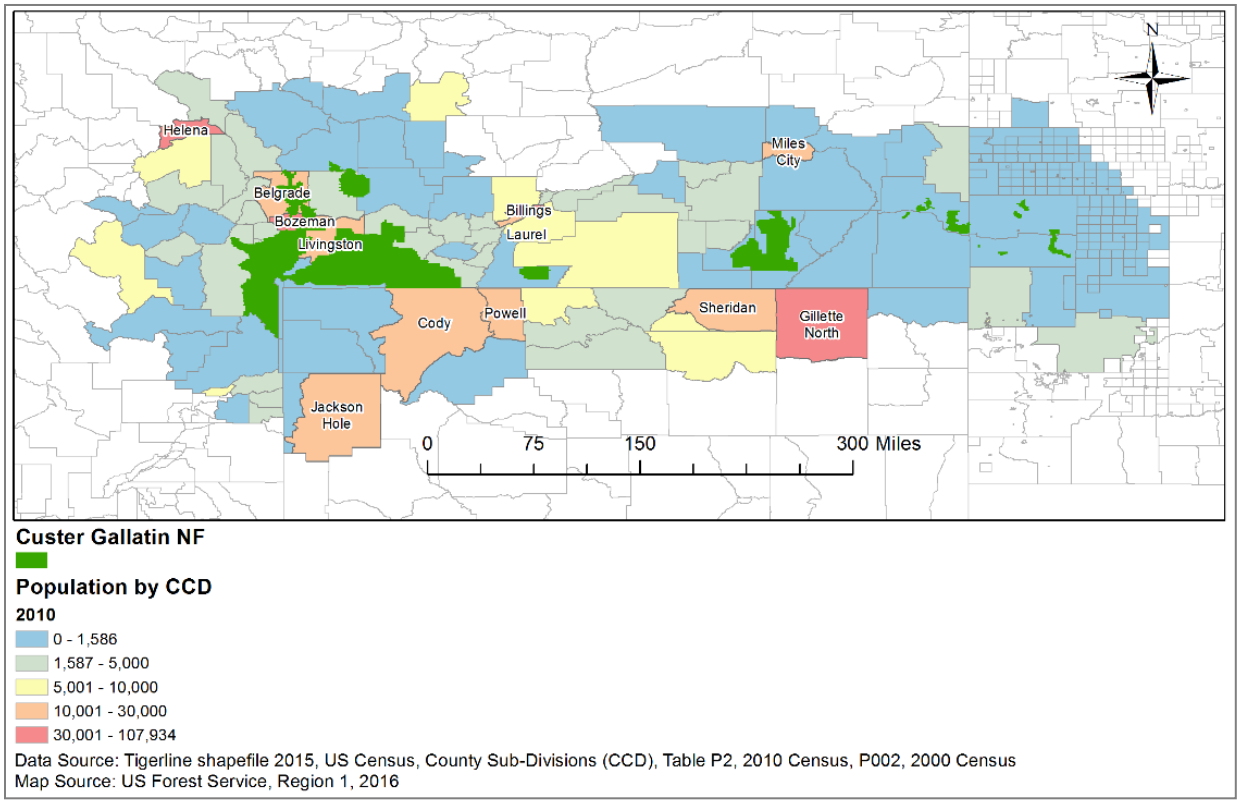

Figure 5. Population in the social area of influence, 2010

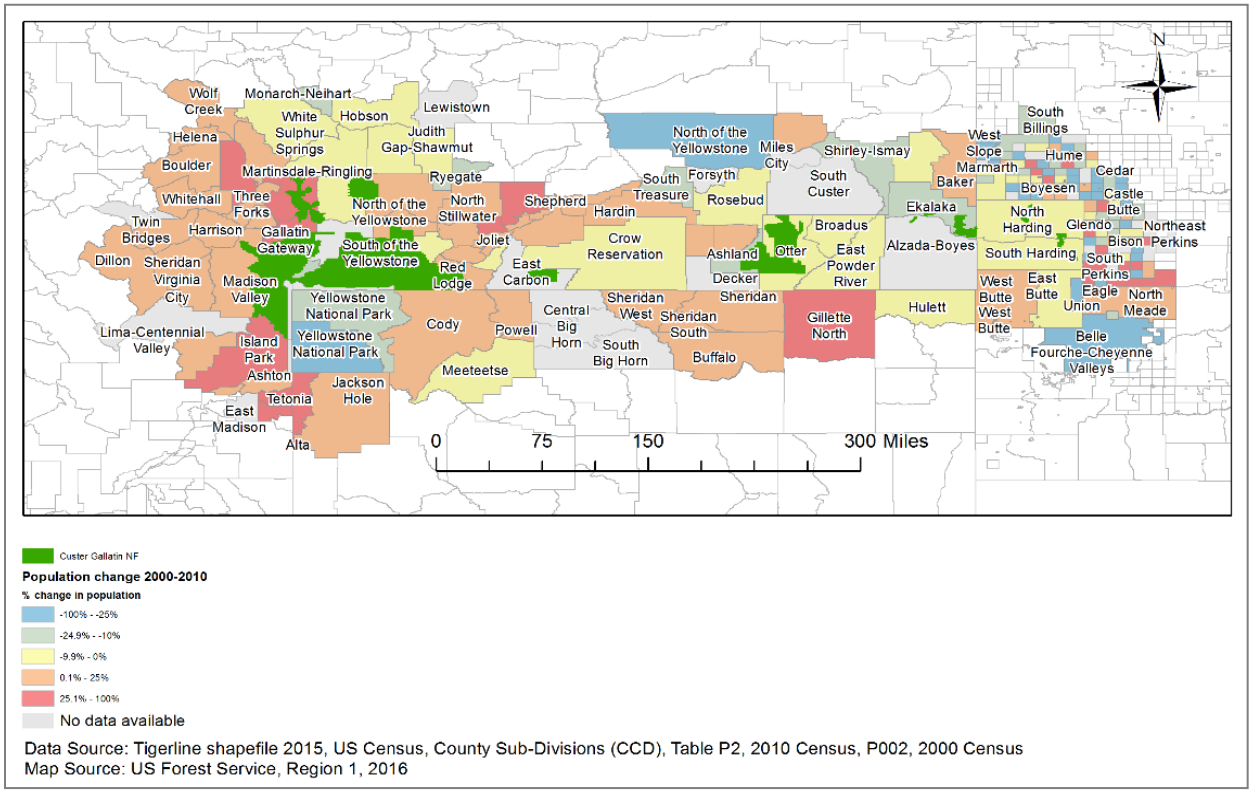

Figure 6. Population change by Census County Division, 2000-2010

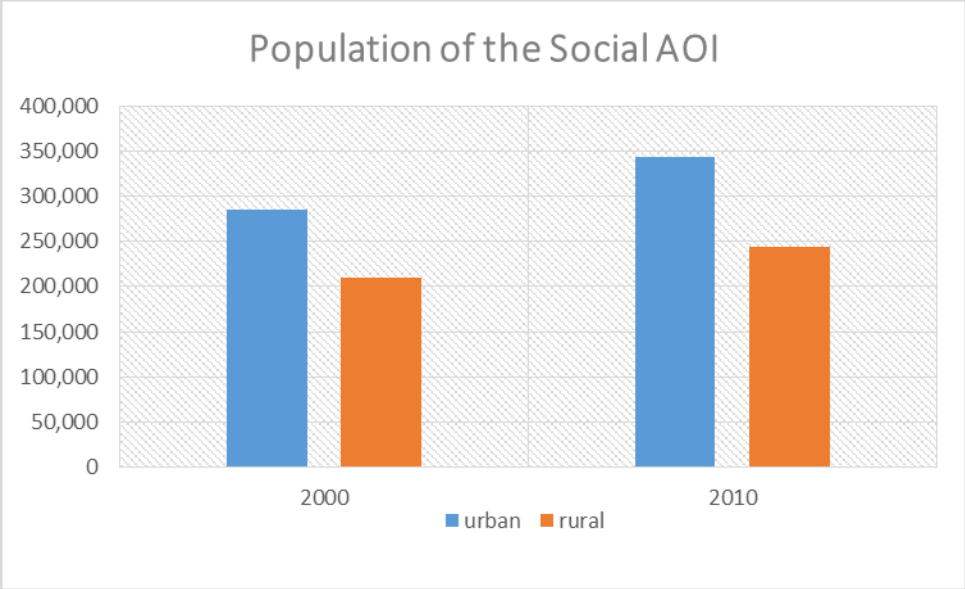

Figure 7. Population in 2000 and 2010 in the social area of Influence (data source: US Census. 2000 and 2010. Population counts by urban and rural county subdivisions)

Dillon, Helena, Bozeman, Shepard, Northwest Yellowstone, Belgrade and South Yellowstone added more urban residents. The most significant change was in Belgrade, which shifted from having a majority of rural residents to having an urban majority. **Error! Not a valid bookmark self-reference.** shows the ratio of urban to rural residents in 2000, 2010 and the percent change between 2000 and 2010. Communities listed in blue experienced an increase in the proportion of rural residents. Communities in red experienced an increase in the proportion of urban residents.

Table 2. County subdivisions with greatest change in urban to rural population ratios, 2000 and 2010

County Subdivision	Urban-to-Rural Population Ratio (2000)	Urban-to-Rural Ratio Population (2010)	Percent Change in Ratio of Urban to Rural Population (2000-2010)
Belle Fourche-Cheyenne Valleys SD	3.1	0.1	-96.95
Belle Fourche city	50.3	14.8	-70.66
Billings CCD	137.0	99.0	-27.71
Hardin CCD	4.5	3.8	-16.75
Lewistown CCD	2.4	2.0	-14.33
Miles City CCD	11.4	10.2	-10.65
Dillon CCD	1.3	1.4	10.57
Helena CCD	3.9	5.0	27.78
Bozeman CCD	4.0	5.3	30.00
Shepherd CCD	0.0	0.1	67.63
Northwest Yellowstone CCD	0.4	0.7	90.32
Belgrade CCD	0.9	2.3	155.77
South Yellowstone CCD	0.2	0.6	164.96

In Figure 8, communities in yellow, orange and red experienced an increase in urbanization. Communities in blue and light blue experienced a decrease in urbanization. It is clear that communities around Belgrade and Bozeman experienced the greatest increases in urbanization for areas near the forest.

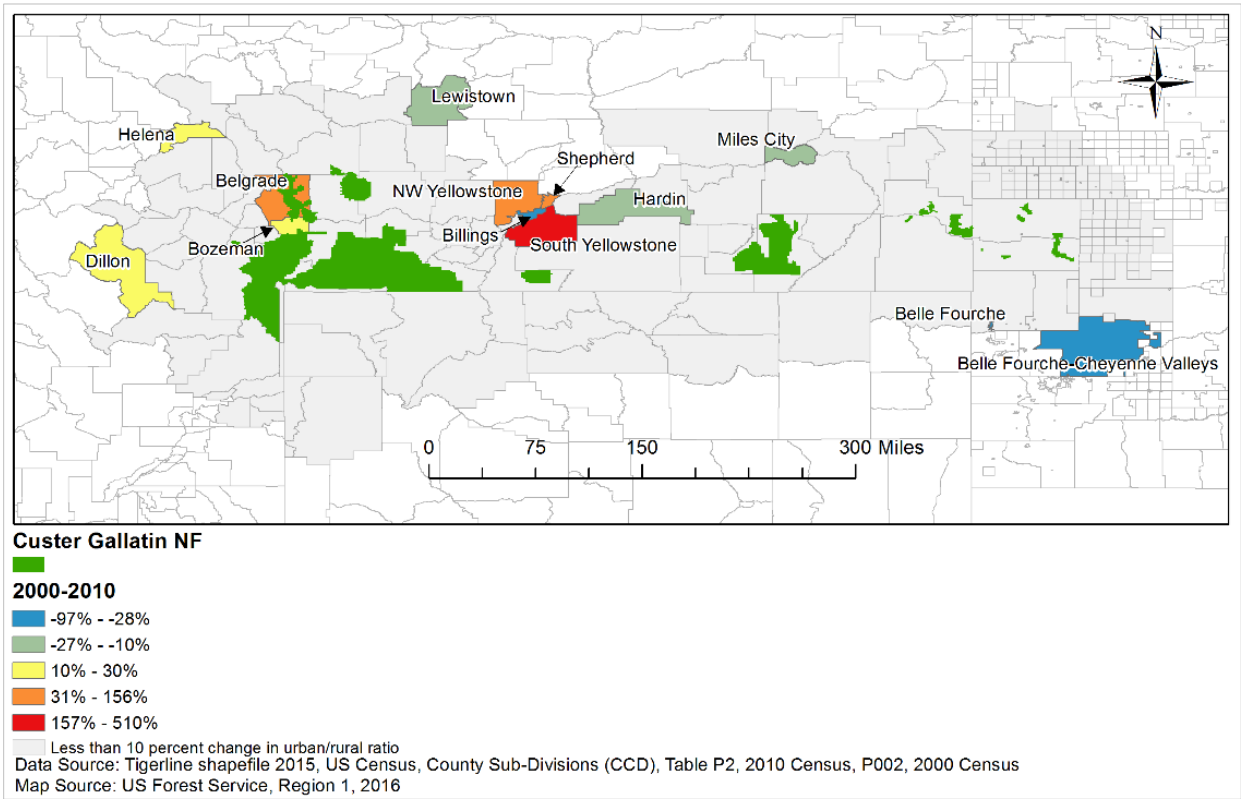

Figure 8. Percent change in urban to rural population ratios (2000 to 2010)

Population projections are not available at the sub-county level. However Montana and Wyoming do provide projections at the county level. The tables below display the population projection for counties in Wyoming and Montana which contain Census County Divisions within the social area of influence. In Wyoming, Teton County, which contains 3 Census County Divisions in the social areas of influence, is expected to grow by 36 percent between 2010 and 2030, a substantial population increase. In Montana, Custer, Fallon and Gallatin counties are projected to grow by 30 percent or more. These projections suggest that communities in all five geographic areas of the Custer Gallatin National Forest are expected to increase significantly in the coming decades, which may in turn, substantially increase the demand for the benefits the Custer Gallatin National Forest provides.

Table 3 and Table 4 show the 2010 population, the 2030 projected populations, as well as the percent change in population for counties which contain Census County Divisions in the social area of influence in Wyoming and Montana (respectively).

Table 3. Projected population change by counties in the social area of influence in Wyoming, 2010-2030

Wyoming	No. of CCD	2010 Pop.	2030 Pop.	Pop Change (2010-2030)
Big Horn County	3	11,668	13,440	15%
Campbell County	1	46,133	57,910	26%
Crook County	1	7,083	8,490	20%
Johnson County	1	8,569	9,520	11%
Park County	4	28,205	31,890	13%
Sheridan County	3	29,116	33,650	16%
Teton County	3	21,294	28,870	36%

Data Source: Wyoming Department of Administration & Information, Economic Analysis Division (http://eadiv.state.wy.us), February 2015

Table 4. Projected population change by counties in the social area of influence in Montana, 2010-2030

Montana	No. of CCD	2010 Pop.	2030 Pop.	Pop Change (2010-2030)
Beaverhead County	2	9,256	10,048	9%
Big Horn County	4	12,925	11,925	-8%
Broadwater County	2	5,636	5,626	0%
Carbon County	5	10,079	9,348	-7%
Carter County	2	1,157	1,480	28%
Cascade County	1	81,509	96,502	18%
Custer County	4	11,710	15,244	30%
Fallon County	2	2,891	4,312	49%
Fergus County	1	11,594	11,386	-2%
Gallatin County	8	89,616	116,627	30%
Golden Valley County	1	886	804	-9%
Jefferson County	2	11,419	13,089	15%
Judith Basin County	1	2,069	2,318	12%
Lewis and Clark County	2	63,604	74,495	17%
Madison County	5	7,698	8,859	15%
Meagher County	2	1,890	1,914	1%
Park County	4	15,587	15,939	2%
Powder River County	3	1,737	1,882	8%
Rosebud County	5	9,264	9,413	2%
Silver Bow County	1	34,233	35,487	4%
Stillwater County	4	9,110	9,060	-1%
Sweet Grass County	2	3,622	4,323	19%
Treasure County	1	721	865	20%
Wheatland County	2	2,162	2,799	29%
Yellowstone County	6	148,450	180,520	22%

Data Source: Census & Economic Information Center (CEIC), a product of Regional Economic Models, Inc. (REMI) known as eREMI. http://ceic.mt.gov/Population/PopProjectionsTitlePage.aspx

The average proportion of people 62 and older in the social area of influence is 27.5 percent. This is on par with the 5-state average of 26.3 percent. The distribution of older populations does vary by community. In Figure 9, communities in yellow and red have meaningfully larger proportions of people aged 62 and older. The bulk of these communities are located on the eastern end of the forest or the far western edge of the social area of influence. In communities with older populations, there may be higher demand for developed recreation, compared to backcountry access, as developed sites are much easier for the elderly to access. Older populations could also signify more traditional, utilitarian values around forest management, as compared to a more distanced, preservationist ethic more commonly found in younger populations (Teal et al. 2005). Given the distribution of older communities, there are likely differing values in communities that neighbor the forest. For example, west of the Custer Gallatin National Forest, there are both older and younger communities, side by side, suggesting that there are likely both utilitarian and preservationist values in communities that surround the Gallatin side of the Custer Gallatin National Forest.

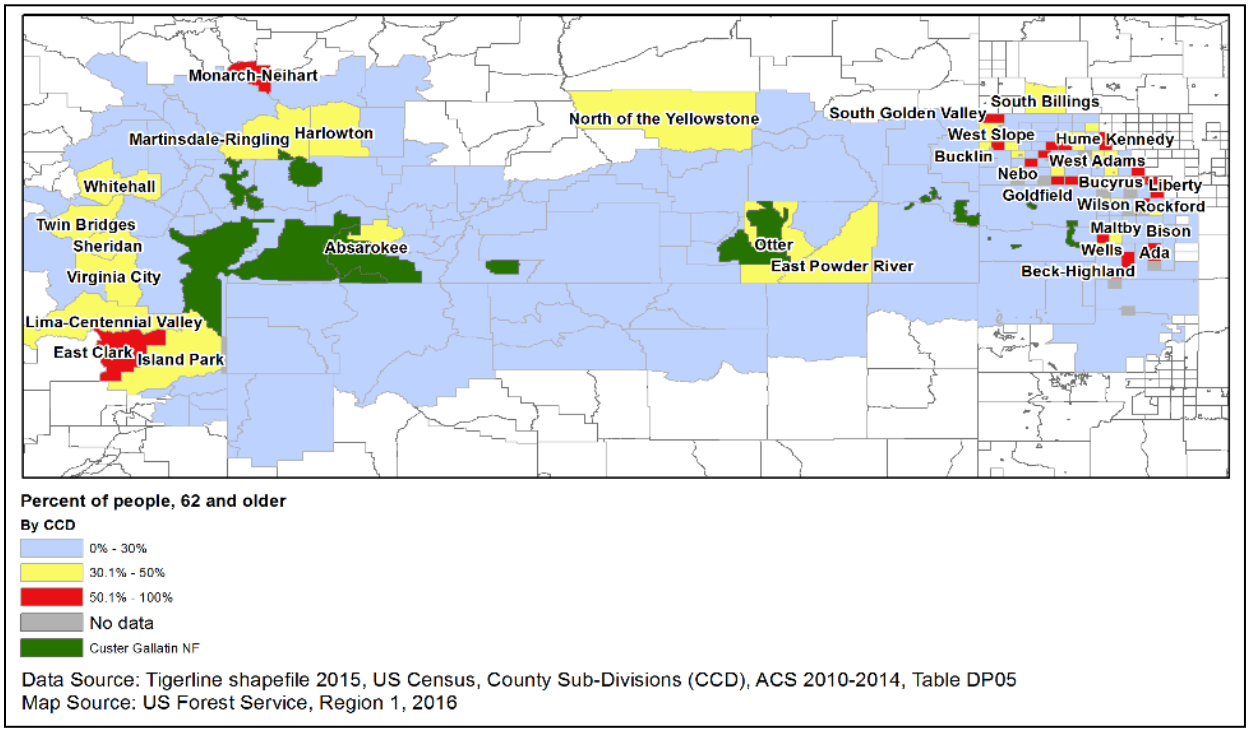

Figure 9. Communities by percent of population 62 and older

Environmental Justice: High Minority and/or High Poverty Communities

The Planning Rule requires that the assessment identify whether or not environmental justice populations exist in the area of influence. These populations are defined here as Census County Divisions (a proxy for communities) with a poverty rate over 20 percent and/or a minority population of 20 percent or greater. While the Council on Environmental Quality (CEQ) direction on environmental justice defines a minority population as an area with 50 percent or greater minority (CEQ 1997), Periman and Grinspoon (2014) advocate for a more inclusive approach, which defines minority populations as communities with a “meaningfully greater minority population than the adjacent geographic population” (Periman and Grinspoon, 2014:6). As the bulk of the communities within the social area of influence have a minority population below 5 percent, communities with a minority population of at least 20 percent meet the “meaningfully greater minority population” standard. The average poverty rate across the social area of influence is 9 percent, with a median poverty rate of only 6 percent.

Communities with a rate of over 20 percent are classified as environmental justice communities as these populations have a poverty rate that is meaningfully greater than the adjacent geographic population. Figure 10 shows the location of these communities, the bulk of which are located on the eastern side of the forest. Communities labeled in black text, and colored orange or red have high levels of poverty. Communities with a cross hatch (and labelled in purple text if not already labelled in black) have high proportions of minority populations. The Crow Reservation and the Northern Cheyenne Reservation are of particular concern, given the high levels of both poor and minority populations in those communities.

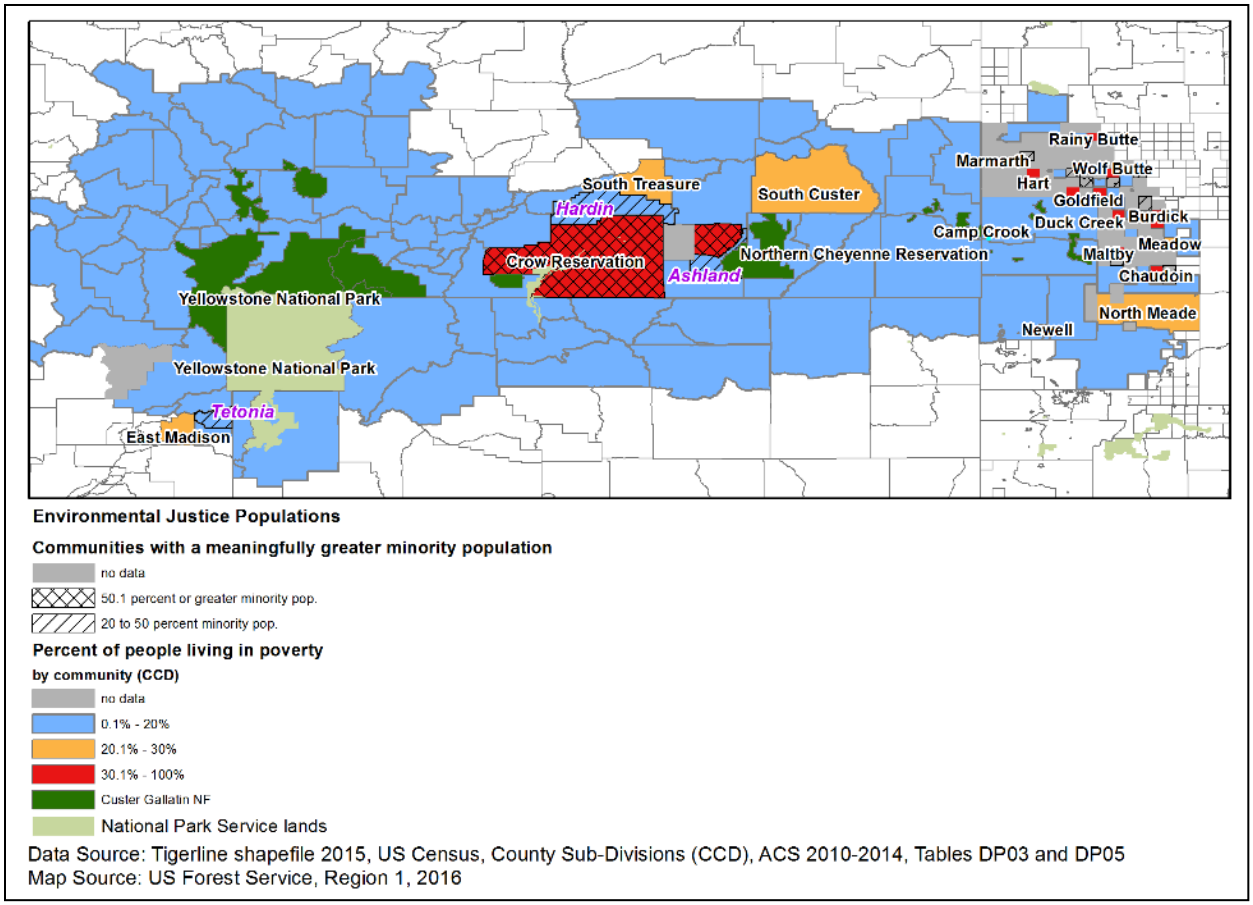

Figure 10. Distribution of environmental justice populations across the social area of influence

Summary

The communities around the Custer Gallatin National Forest are growing, and are projected to continue to grow in the coming decades. There continues to be a high demand for both urban and rural lifestyles. Although populations are increasing in urban areas, they are also increasing in rural areas, suggesting that increasing demand for forest benefits such as recreation and grazing will continue into the coming decades. While the social area of influence has a similar proportion of elderly communities, compared to the state averages, there are also higher than average concentrations of older populations in some communities close to forest boundaries. This suggests the presence of populations that hold more traditional, utilitarian values around forest resources and more demand for developed recreation opportunities, which older populations can access more easily. There are also many younger, urban communities around the forest, which are more likely to hold distanced, preservationist values and prefer less developed recreation. Given the diversity of communities in the social area of influence, forest managers will need to balance a broad range of values and interests.

There are high minority and high poverty communities in the social area of influence. Special attention must be given to these populations during the planning process to ensure no undue harm is caused to these vulnerable communities. Table 5 summarizes the key demographic characteristics by area of the forest.

Table 5. Summary of key demographic characteristics by area of the Custer Gallatin National Forest

Demographic Characteristics	Social AOI	Madison, Henry's, Gallatin, Absaroka Beartooth Mountains	Bridger, Bangtail, Crazy Mountains	Pryor Mountains	Ashland District	Sioux District
Population size	590,000	Large	Large	Medium	Small	Small
Population Change (2000-2010)	Increase	Mostly large increase	Mostly increased	Mostly increased	Mostly decreased	Mostly decreased
Urbanization	No Change	Large increase	Increased	Increased	Decreased	Decreased
Projected Population Change (2010-2030)	Increase	Large Increase	Increase	Increase	Increase	Increase
Older population rate	Average	High/Low	High/Low	Low	High/Low	High/Low
Low Income Populations	Yes	No	No	Yes	Yes	Yes
Minority Populations	Yes	No	No	Yes	Yes	Yes

Well-being

This section provides data on general well-being levels of communities, as they relate to forest planning. General indicators of the well-being of populations are: education, income, and employment.

Educational Attainment

Educational attainment is a common indicator of well-being as it is linked to a host of social and economic outcomes including: median earnings, homeownership, health, and children's outcomes. Those with higher levels of educational attainment are also considered less vulnerable to economic and environment shocks (such as the Great Recession and climate change), respectively (Romero Lankao, Qin and Borbor-Cordova, 2013).

Shown in Figure 11 are communities within the social areas of influence where 22.6 percent of the population has a bachelor's degree or higher. This is slightly above the 5 state (Idaho, Montana, North Dakota, South Dakota, Wyoming) average of 20. 8 percent. Communities on the western end of the forest have higher levels of educational attainment, compared to the eastern communities. This suggests that western communities are more likely to hold distanced or preservationist values, compared to communities in the eastern areas (Teal et al. 2005). Communities with lower levels of educational attainment are also more vulnerable to economic shocks, as it may be more difficult for workers to change careers without a bachelor's degree. Given the lower levels of educational attainment, communities around the Pryor Mountains and the Ashland District may be more vulnerable than those in the western part of the Custer Gallatin to economic shocks, such as a plant closure or a significant reduction in industry operations.

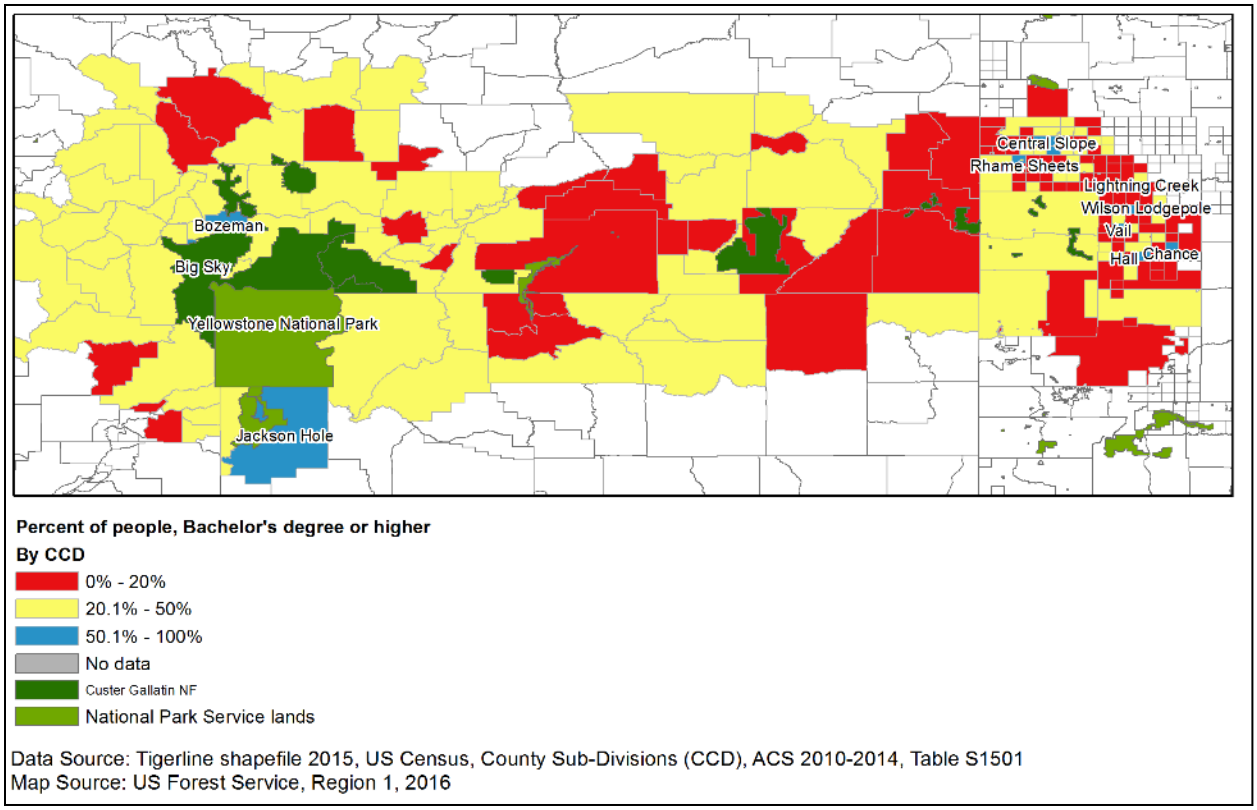

Figure 11. Education attainment in the social area of influence

Income and Employment

Employment and income statistics are important indicators of the economic health of an area. Understanding which industries are responsible for most jobs and which sectors are growing or declining is key to grasping the type of economy that exists, how it has changed over time, and evolving competitive strengths. It also provides information on how the commodity sectors and the travel and tourism-related sectors described in the previous sections fit in with the rest of the economy.

Another important indicator of economic health and wellbeing is the unemployment rate. It is low during good economic times and high during recessions. In an economic downturn, the rate tends to underestimate the number of unemployed because some people become discouraged and stop looking for work.

At the individual level, unemployment reduces household income, limits access to health insurance, and contributes to psychological stress. At the community level, a rise in joblessness reflects a lack of employment opportunities and places demands on community services.

The level of, and changes in, per capita income and average earnings are also important for assessing the state of the economy and the well-being of individuals in the community. Changes in per capita income reflect economic growth in a community. In addition, comparisons between state and local area per capita income provide insight into the relative economic well-being of a community. Low per capita income may indicate that the local economy does not adequately support individuals and families. However, per capita income can sometimes be misleading. Since total personal income includes income from 401(k) plans as well as other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise, even if the average wage per job declines over time. In other

words, non-labor sources of income can cause per capita income to rise, even if people are earning less per job. Also, because per capita income is calculated using total population and not the labor force as in average earnings per job, it is possible for per capita income to be relatively low when there are a disproportionate number of children and/or elderly people in the population. Average earnings, on the other hand, are an indicator of the quality of local employment, in terms of high-wage jobs.

Table 1 (in Appendix A) provides an overview of economic conditions in the Custer Gallatin area of influence. This summary table highlights major trends in population, income, and employment between 1970 and 2014. Additionally, Table 1 (in Appendix A) highlights key economic indicators and provides a snapshot of economic sectors most prevalent in the area of influence. Key indicators include unemployment rate, per capita income, and non-labor income for each County. A great deal of information can be gleaned from Table 1, and additional details on income, employment and other data are provided below. For more information relating to key economic indicators see Tables 2 through 9 (in Appendix A).

Income

Income data for the multi counties in the economic area of influence share patterns consistent with income trends in the West. Table 2 (in Appendix A) show average per capita income, and bracketed total household incomes. Per capita income is the sum of total personal income for the area of interest divided by the sum of total population in the area. So there are differences in both the numerator (labor income versus total personal income) and the denominator (employment versus population). Total personal income includes non-labor sources of income, such as dividends, interest, and rent; and transfer payments. As such, this metric is most helpful in describing the totality of income-related wealth in an area, and how it proportions to the population. Smaller communities with a few very high net worth individuals might appear prosperous based on per-capita income, even if the great majority of individuals belong to lower economic strata. This potential for outlier bias is diminished in larger populations, where the law of large numbers has greater influence. Average household income attempts to describe average level of income available to each household in a population. Since there are few households than individuals, this number will always be higher in the same community.

Within Table 2 (in Appendix A), counties with the lowest per capita and household income include Big Horn and Madison County of Montana, respectively. Other counties, including Carter and Meagher, have a higher proportion of households in the lower income brackets.

Table 3 (in Appendix A) provides additional low-income data including poverty count and levels for the area of influence. Most noticeable are the results for Big Horn and Rosebud County, Montana; both are above the national average and Big Horn County is nearly twice estimated national average.

Additional tables in the appendix provide industry and sector specific information, across counties.

Non-labor Income

Communities with high non-labor income may indicate populations with a higher proportion of retired or disabled individuals. Alternatively, if the source of non-labor income is from public assistance programs or food stamps, this can indicate populations with relatively higher levels of poverty and social assistance needs. Breaking non-labor income detail out across sources of income helps distinguish these characteristics. Table 4 (in Appendix A) does this by showing estimates for households receiving non-labor income by income source across the area of influence. Most noticeably, 21 percent of Big Horn

County, Montana households receive food stamps as a form of non-labor income. For most other rural counties, a high proportion of households receiving social security or retirement income exist.

Employment

Employment information provides a focused perspective of the working subpopulation, and can help identify the assortment of economic activity within a county or region. In addition to unemployment information shared in Table 1 (in Appendix A), Table 5 (in Appendix A) reviews employment in greater detail, by industry, and describes the distribution of jobs across counties. The Bureau of Economic Analysis maintains data shown in Table 6 and the American Community Survey maintains data shown in Table 5 (in Appendix A). Both Bureau of Economic Analysis and American Community Survey data are organized by a system called the North American Industry Classification System (NAICS), which has been in use since 2001. The most current year is 2014.

Of the 111,550 jobs in the area of influence, over half exist in Gallatin and Park County, the other jobs represent mostly rural economies. Rural counties typically maintain a higher proportion of jobs in agriculture and natural resource industries; whereas more densely population counties tend to have greater diversity across economic industries including education and health care. These trends are not always held true, as is the case across the Custer Gallatin area of influence. Most noticeable is the diversity of county types among those included in the area of influence. The largest industry overall is a combination of education, health care, and social assistance, which represents approximately 23 percent of the entire economy. Overall, natural resources and agriculture represent 10 percent.

Table 6 (in Appendix A) holds information specific to labor participation (unemployment indicator shown in Table 1 in Appendix A). It is estimated that 111,550 jobs were in the area of influence 2014, and a total of 145,269 individuals live in the area of influence between the ages of 16 and 64. This indicates approximately 17 percent of this population never held employment in 2014. In Big Horn County, Montana, this percentage was highest at nearly 30 percent, and in Gallatin County, it was the lowest at 13.6 percent. Approximately, 57.7 percent of this total population held full-time equivalent employment, between 50 and 52 weeks per year.

Details for employment and labor income contributed directly from the Custer Gallatin National Forest can be found in Forest Service Job and Income contributions, At-A-Glance reports (www.fs.fed.us/emc/economics/contributions/at-a-glance.shtml). Economic contribution areas often include multiple U.S. counties and are more accurately reported at the Forest, rather than county-level. Shared from the Custer and Gallatin reports, Table 6 below highlights the most recent estimate (2014 data) for jobs contributed from Custer Gallatin resources and resource management investments. It is estimated that between 3,989 and 4,789 direct and secondary jobs were contributed in 2014 to communities surrounding this National Forest. A range in estimated jobs exists due to economic model input data errors associated with the unique mining sectors in this region.

Table 6. Estimated Total Employment Contribution from the Custer Gallatin National Forest (2014)

Resource	Total Employment Contribution
Livestock Grazing	423
Forest Products	39
Minerals & Energy Production	1,200 – 2,000
Payments to State/County	147
FS Resource Management	547
Total Recreation Visitor Use	1,633
All Resources	3,989 – 4,789

Multiple-Use Sector Employment

Industries most influenced by Custer Gallatin National Forest land management are those which rely on natural resources, mining, travel tourism, and recreation. In this section, further detail is provided on these industries across each county in the economic area of influence. Table 7 (in Appendix A) is a summary table showing the proportion of private employment in service and non-service sectors across counties. Jobs in the non-service sector include those working directly in natural resources, forest product manufacturing, and mining.

Stillwater and Sweet Grass County of Montana have the highest proportion of non-service sector jobs, with 48 and 42 percent of all employment, respectively. These proportions are an important indicator of natural resource and land management dependency. Economies with larger populations on the Custer Gallatin area of influence exhibit greater proportions of their work force in services industries. Counties in around the Bozeman area have the highest proportion of their economies working in leisure and hospitality, as well as health care and other professional business services.

Taking a closer look at agriculture, forestry, and mining, Tables 8 through 10 (in Appendix A) highlight these industries in greater detail. Agriculture is an important industry across most of the area of influence. Forestry and forest products and mining are only significant employment sources in certain counties. Timber and wood product manufacturing account for less than an estimated 300 jobs in the area of influence, whereas mining provides an estimated 3,700 jobs, and agriculture 8,998. Proportionally, these are estimates out of a total of 111,550 total jobs in the area of influence.

Presence of Federal Land and Federal Land Payments

Rural counties with greater proportions of federal land are typically more dependent, economically and otherwise, on land management policies. Looking at data from U.S. Geological Survey and NASA, Table 11 (in Appendix A) highlights proportional federal land ownership. Federal lands represent a significant holding in certain counties including: Big Horn and Park County Wyoming, Madison, Meagher, Gallatin, Carbon, Carter, Powder River, and Park Counties in Montana. The Custer Gallatin National Forest, specifically, represents a large portion of land in Gallatin, and Park County, Montana.

These lands produce a significant amount of revenue for local governments through employment income and directly through federal land payments. Additional information on federal land payments is provided in the following benefits section. Income is a significant benefit from National Forest System lands. Income all together includes employment sourced income, as well as federal land payments for county governments.

Further, Table 12 and 13 (in Appendix A) relay information specifically on federal land payments. Federal land payments compensate governments for non-taxable federal land within their borders and payments are funded by federal appropriations. Types of federal land payments include payments in lieu of taxes (PILT), Forest Service and other agency revenue sharing, and federal mineral royalties which are distributed by the U.S. Office of Natural Resource Revenue.

These programs can represent a significant portion of local government revenue in rural counties with large federal land holdings. Federal land payments have the potential to change and be influenced by land management policy. Headwaters Economics Economic Profile System informs that

> "before 1976, all federal payments were linked directly to receipts generated on public lands. Congress funded PILT with appropriations beginning in 1977 in recognition of the volatility and inadequacy of federal revenue sharing programs. PILT was intended to stabilize and increase federal land payments to county governments. More recently, the Secure Rural Schools and Community Self-Determination Act of 2000 (SRS) decoupled USFS payments from commercial receipts. SRS received broad support because it addressed several major concerns around receipt-based programs--volatility, the payment level, and the incentives provided to counties by linking federal land payments directly to extractive uses of public lands. PILT and SRS each received a significant increase in federal appropriations in FY 2008 through the Emergency Economic Stabilization Act of 2008. Despite the increased appropriations, SRS is authorized only through FY 2011, PILT only through FY 2012, and federal budget concerns are creating uncertainty for the future of both."

Table 12 (in Appendix A) highlights two income streams that can be potentially influenced by Forest Service land management. The payments in lieu of taxes and Forest Service payments contribute mainly to county level government, school districts, and grazing districts across the Custer Gallatin area of influence (Table 13 in Appendix A). Together these income streams provide approximately $13.8 million in local government revenue.

Health and Safety

The health and safety conditions of the social area of influence area are relevant to forest planning as certain land management decisions may improve or worsen community health conditions. Therefore, it is important to consider the current health conditions that directly relate to forest management. Data for community health are readily available at the county level from the University of Wisconsin, Population Health Institute. Indicators of community health and safety most related to forest planning include access to exercise opportunities, air quality, income inequality, and violent crime rates. The last two are pertinent as resource extraction projects may lead to the creation of "boom towns," which have been shown to increase income inequality, temporarily disrupt communal ties, and increase fear of violent crime in the short term (Smith et al. 2001). Communities with higher levels of income inequality have weaker social ties, more spatial segregation by income class, less equitable distribution of public resources and thus, greater vulnerability to natural hazards. (Klinenberg 2002; Rasch 2016; Wilkinson and Pickett 2010). Data are provided for the eleven counties that contain Custer Gallatin National Forest lands, as these are the populations whose health and safety are most closely tied to forest management. Table 7 shows the data and quartile for each indicator, where available). The quartile is listed as 1 through 4, where 1 indicates the highest relative level of health or safety and 4 indicates the lowest relative level. All counties scored either a 1 or 2 on air pollution, suggesting that air quality in counties near the forest is high. Access to exercise, income inequality and violent crime rates vary across counties. Carbon, Park, and Powder River counties all have higher rates of violent crime. Big Horn MT,

Carbon, Powder River, and Rosebud counties all have higher rates of income inequality. Big Horn MT, Carbon, Madison, Rosebud, and Stillwater counties all rate in the bottom quartiles on access to exercise.

Table 7. Health and safety indicators by county

	Access to exercise opportunities[1]		Income inequality Ratio[3]		Violent crime[4]		Air pollution - particulate matter[2]	
County, State	**% With Access**	**Quartile**	**II Ratio**	**Quartile**	**Violent Crime Rate**	**Quartile**	**Average Daily PM2.5**	**Quartile**
Big Horn, MT	42	3	5.4	4	200	2	10.6	1
Carbon, MT	42	3	4.6	3	250	3	10.7	1
Carter, MT	22	NR	4.8	NR	29	NR	10.1	NR
Gallatin, MT	79	1	4.2	2	193	2	10.8	2
Madison, MT	33	3	3.8	1	73	1	10.6	1
Park, MT	64	2	4.0	1	245	3	10.8	2
Powder River, MT	56	2	4.8	4	NR	3	10.3	1
Rosebud, MT	26	4	4.8	4	179	2	10.6	1
Stillwater, MT	44	3	4.2	2	211	2	10.8	2
Sweet Grass, MT	68	1	4.4	2	182	2	10.9	2
Harding, SD	19	NR	4.3	NR	26	NR	9.9	NR
Meagher County, MT	67	NR	3.6	NR	175	NR	11.3	NR
Big Horn, WY	47	NR	3.7	NR	177	NR	10.3	NR
Park, WY	66	NR	3.6	NR	242	NR	10.4	NR
Custer, MT	62	NR	4.4	NR	190	NR	10.4	NR

1 Percentage of population with adequate access to locations for physical activity
2 Average daily density of fine particulate matter in micrograms per cubic meter (PM2.5)
3 Ratio of household income at the 80th percentile to income at the 20th percentile
4 Number of reported violent crime offenses per 100,000 population
Source: County Health Rankings and Roadmaps, 2016, http://www.countyhealthrankings.org/app/montana/2015/

Traditional/Cultural/Spiritual Values

The traditional, cultural and spiritual values of people in the social area of influence are relevant to forest planning. While it is beyond the scope of the assessment to collect primary data on values of people in the social area of influence (and the general public), there are some secondary data sources that provide insight into which benefits the forest provides that are most in line with the values of local communities and the general public. A review of county growth policies provide some insight into values of community members. Consultation with Forest Service staff and the public also provided further insight. A review of surveys on national and local preferences for wildlife management and land management also provided useful information in terms of what people value from the forest, from a traditional, cultural, and/or spiritual perspective.

As noted in the demographic section above, the populations in the social area of influence are quite diverse, from a values perspective. Communities include both rural and urban residents, young and old, highly educated and those without college degrees, new amenity migrants and long-term residents, Native Americans and whites. Given these community demographics, populations are likely to include the full range of (often conflicting) values that relate to forest management (Winter et al. 2014). These

include those who want more and less economic development of minerals and timber, more and less grazing, more and less access to recreation, and more and less preservation of ecosystems and wildlife (Teal et al. 2005). Traditional, cultural, and spiritual values, (data permitting) as they relate to preferences for specific forest benefits, are described in more detail below, in the social impact sections, under the relevant forest benefits.

Benefits People Obtain from the National Forest System Planning Area (Including Ecosystem Services)

The key benefits of the forest that contribute to social and economic sustainability are described below. These include relevant benefits of multiple uses, ecosystem services, infrastructure and operations. The discussion of each benefit includes (where applicable and where data allow):

- Description of the benefit
- Impacts of social and economic conditions on the benefit
- Impacts of other conditions/risks/stressors (broader landscape, climate change, conflicting benefits, etc.) on the benefit

Key benefits listed here are selected as those that have the potential to impact social and economic conditions and additionally have the potential to be influenced by Custer Gallatin National Forest management actions.

Clean Air

Description of the benefit: One reason people visit public lands especially national forests and national parks is for the vistas and to breathe “fresh air”. Good air quality promotes tourism and recreation which contributes to the economy of gateway communities. Additionally, good air quality promotes and nurtures human health. Clean air is also important for maintaining healthy plants, animals, soils, and water bodies (which are sources of drinking water).

Short-term air quality impacts from wildland fire smoke can have immediate negative consequences for recreation and tourism. Impacting smoke can be local or long-distance in nature. Long-term duration of poor air quality can negatively affect water bodies which can lead to degradation of drinking water, increase algal blooms, and decrease in native fisheries. Poor air quality can also negatively impact terrestrial ecosystems leading to the extirpation of rare, sensitive, and native plants and the increase in invasive plants. Decrease in fisheries and increase in algal blooms negatively affect tourism and cost substantial amounts of money and resources to restore.

For more information on this benefit see the Air Quality specialist report (McMurray 2017).

Social and economic conditions impact: As populations in counties including Gallatin, Yellowstone, Park, and Madison continue to grow, existing and new sources of air pollution will be displaced into surrounding airsheds. In the more rural landscapes of the Custer Gallatin National Forest, this will not likely become as much of an issues.

Increasing point and mobile sourced air pollution has the potential triple effect of increasing the value of clean air provided by the Custer Gallatin National Forest, offsetting the appeal of lifestyle and health benefits received from living in the area, and may potentially combine with and increase negative health effects from wildfire smoke.

Other Impacts: Additional benefits exist from the mining and processing of minerals on the Custer Gallatin National Forest that function as an input to catalytic converters placed in vehicles across the county. These minerals make a significant contribution to air pollution mitigation as a result. It is expected that these mining operations will continue to reduce air pollution along with expanded use of combustions engines in transportation, globally.

Clean Water and Aquatic Ecosystems

Description of the benefit: Aquatic ecosystems on the Custer Gallatin National Forest support a variety of direct human uses. Among these are angling, municipal and residential water supply, and agricultural uses (stock water, irrigation). In addition, these ecosystems provide a variety of additional benefits, such as flow modulation (buffering both flood and baseflows), scenery, etc.

In addition to the nationally and internationally known fisheries, the Custer Gallatin National Forest supports diverse locally and regionally important angling opportunities. Among these are high mountain lakes, where species like golden trout, lake trout, and Arctic grayling are targeted species for some anglers and prairie reservoirs, where largemouth and smallmouth bass, panfish, and put-and-take rainbow trout are targeted species.

Additionally, the Custer Gallatin National Forest directly provides municipal water to the cities of Red Lodge, West Yellowstone, and Bozeman. Indirectly, streams emanating from the Custer Gallatin assist in supplying water to cities like Billings and Laurel and are the groundwater recharge zone for residential supplies in many places. A less commonly considered benefit of Custer Gallatin National Forest watersheds is flow modulation – essentially, moderating both high and low flows through the function of floodplains and wetlands. Water storage and retention in Custer Gallatin floodplains can both reduce the rate and duration of peak flow response, but also assist in retaining base flows.

For more information on this benefit see the Aquatic and Riparian Ecosystem specialist report (Barndt et al. 2017.).

Social and economic conditions impact: Carter, Gallatin, Harding, Madison, Park, Powder River, and Sweet Grass county growth polices all cited maintaining a clean water supply as a priority to ensure the health and safety of county residents.

Other impacts: Climate change will likely lead to increased frequency of wildfire and floods (Warziniack and Lawson, In Press). These more frequent occurrences may adversely affect water quality due to increased sediment in rivers and reservoirs.

Conservation of Ecosystems (Lands, Rare Plants, and Species for Fishing, Hunting, and Wildlife Viewing)

Description of the benefit: See the “Benefits to People” sections in the Vegetation and Wildlife specialist reports (Sandbak 2017, Reid 2017, Dixon et al. 2017.)

Social and economic conditions impact**:** Carbon, Carter, Gallatin, Madison, Park, Powder River, and Sweet Grass county growth policies all cite conservation of soils as important to residents and/or their local economies. Park and Sweet Grass counties policies mention managing invasive species as a priority.

Carter, Gallatin, Meagher, Harding, Madison, Park, Powder River, and Sweet Grass county growth policies all cite fishing as important to residents and/or their local economies.

Carter, Madison, Meagher Park, Powder River, and Sweet Grass county growth policies all cite hunting as important to residents and/or their local economies. The 2016 Rural Montana survey (Muste 2016) data showed that 35.7 percent of respondents thought federal lands should be managed to protect the land and wildlife. Fifty percent of respondents listed "nature and a clean environment" as what they valued most about Montana. The influx of population to the social area of influence, particularly the natural amenity migrants who relocated to enjoy outdoor recreation, may have negative impacts of wildlife habitat (Winter et al. 2014).

Other impacts: Wildlife and wildlife habitat are highly valued resources on the Custer Gallatin National Forest, despite potential resource conflicts. Wildlife and wildlife habitat continue to be stressed by growing populations in the intermountain regions of the West. The Custer Gallatin National Forest is no exception, home to many important indicator species and to high population growth rate counties including Gallatin and Park County. Forest management under a new forest plan will be challenged to balance the simultaneous increase in values associated with wildlife and the human-caused stress on their populations and habitat.

Educational and Volunteer Programs

Description of the benefit: The Custer Gallatin National Forest contributes to the education of local communities and the general public through educational programs. The Custer Gallatin offers a suite of conservation and informational programs including avalanche and bear safety trainings. Since 2001, the Custer Gallatin personnel provided at least 30 programs that reached approximately 50,000 members of the public[1] (including forest visitors) (Nature Watch, Interpretation and Conservation Education, 2016). The most frequent programs were about fire, fire prevention and plant and animal conservation. Many of these programs were provided in partnerships with state or local government, schools, and non-profit organizations. These programs enhance the well-being and safety of local residents and visitors alike. Examples include citizen science programs as well as lectures and organized events. The Custer Gallatin also offers a broad array of volunteer programs which provide volunteers with opportunities to connect with nature and learn about conservation. According to data provided in the volunteer database (USDA Forest Service Volunteers and Partners Accomplishment Report (Reference Forest Service Manual 1800) Report, No. FS-1800_AR), since 2011 volunteers have donated over 107,000 hours of service. This is equivalent to almost 60 person-years of service. The volunteer service projects, in order of accumulated hours, are listed in Table 8 by project type. Recreation management was the most popular volunteer service project, followed by heritage resources.

Table 8. Sum of accumulated volunteer hours on the Custer Gallatin National Forest (2011-2016)

Project Type	Hours[2]
Recreation Management	82,387.5
Heritage Resources	17,326
Ecosystem, Forest & Natural Resource Management	2,109
Wildlife, Fish and Threatened & Endangered Species	1,765.5
Lands, Minerals, Geology & Special Uses	1,496
Engineering, Road Maint, Safety & Sustainable Ops	782

[1] This is likely an underestimation as data were not consistently entered into the NICE database until more recently (such as the past five years).

[2] According to the Regional volunteer coordinator, volunteer projects are often under-reported in the database so the hour estimates provided are (more than likely) underestimations of true service hours.

Project Type	Hours[2]
Research and Development	500
Grazing and Rangeland Management	324
Veg, Watershed & Air, Natural Resources Management	304
Facilities	262
State & Private Forestry and Fire	163
Forest Management	86
Total	107505

Data source: USDA FOREST SERVICE Volunteers & Partners ACCOMPLISHMENT REPORT, Reference FSM 1800, Report, No. FS-1800_AR. Data are from April 1st 2011 through April 1st 2016.

Social and economic conditions impact**:** As populations in the social area of influence increase, particularly in the Gallatin area, there may be increased demand for educational programming. Given the high levels of educational attainment in Bozeman, there may also be an increased supply of professionals willing to volunteer their knowledge and experience to educational programs. The increasing population may also offer more willing volunteers able to participate in recreation management programs, which are already popular programs.

Other impacts: Climate change is projected to impact the Custer Gallatin National Forest and surrounding areas. There may be an increasing need for new educational programs focused on climate change impacts and how the public might need to adapt their current behaviors and uses of forest lands. There are also several large landscape conservation initiatives in the Bozeman area. Opportunities to partner with these organizations to create more robust educational programs for the public may be available.

Employee Service to Communities

Description of the benefit: Employees of the Custer Gallatin National Forest play active roles in their communities, volunteering their time to enhancing well-being, health and safety, and cultural opportunities in local communities. In a short survey of forest leadership, employees listed a host of organizations and activities they, or their employees, volunteer their time to serve. These include (but are not limited to) youth mentoring, Eagle Mount, Montana Outdoor Science School, food banks, treating weeds on private lands, school volunteers, soup kitchens, firefighting, county search and rescue, blood drives, toastmasters, emergency medical technicians, hospital boards, boy and girl scouts, churches, coaches, music groups, community fundraising, stream clean-up, big brothers and big sisters, and speech and debate judging.

Social and economic conditions impact**:** Communities benefit from the service of Custer Gallatin National Forest employees. Small communities, with declining populations, such as those on the eastern side of the forest, may be particularly reliant on national forest employees to hold service roles in their communities.

Flood Control

Social and economic conditions impact: Gallatin, Madison, Park, and Powder River county growth polices all cited flood control as a priority to ensure the health and safety of county residents.

For more information on this benefit see the Aquatic Ecosystem specialist report (Barndt et al. 2017).

Other impacts: Climate change will likely lead to increased soil erosion, due to an increase in frequency of wildfire and floods (Warziniack and Lawson, In Press).

Infrastructure

Description of the benefit: Communities and businesses in and near the Custer Gallatin National Forest rely on utility corridors (energy, fiber optic) and communication sites (cellular, radio, emergency response, etc.). These services contribute to quality of life and community sustainability, providing rural communities the ability to connect in a global or regional economy. Additionally, roads, trails, and forest infrastructure provide for safe and reliable access for recreation, resource management, and private inholdings which are tied to community, quality of life, self-identity, economy, and use patterns.

Public use on National Forest System lands is increasing as is the population of Montana, specifically in Billings and Bozeman, two of the larger cities in Montana. There is a greater demand for services as well as greater degradation of the road system from the increased use. This trend is expected to continue. There will continue to be a need to provide access for multiple uses including mining, timber, grazing, and recreation.

The infrastructure is very important for the quality of life for those visiting the Custer Gallatin National Forest. Maintaining and expanding the infrastructure to meet the needs of the forest users is important to the local economies and quality of life for those living in surrounding communities. Almost all county growth plans highlight the need for maintenance and improvement of existing infrastructure.

Forest Products (Including Timber, Firewood, Christmas Trees, Berries, Mushrooms)

Description of the benefit: The Social and Economic Report provides a great deal of information on the economic importance of the timber sector to the analysis area including sections on the timber sector, wildland dependence, federal land payments to states, assessing the economic contribution of major industries in the Custer Gallatin National Forest plan area, and Custer Gallatin National Forest contributions to the plan area economy.

Trends from past and potential future timber products shows a decrease in timber outputs. Timber harvest and construction of the needed roads to access harvest areas is challenged by segments of the public at both the local and national level, with concerns primarily focused on endangered species (such as grizzly bear and lynx) and other wildlife habitat needs. The protracted debate over designation of roadless areas has also substantially limited timber harvest opportunities. It is likely this intense interest in timber management will continue, if not increase, in the future and will impact the level of harvest and supply of commercial forest products.

Timber harvest is a tool that is used to achieve other resource objectives, beyond providing a commercial forest product. Reduced opportunities to use timber harvest will limit the ability to change vegetation structure, species compositions, landscape patterns, and other conditions for the purpose of improving forest resilience, creating desired wildlife habitat conditions, reducing forest fuels, or other purposes.

For more information on this benefit see the Income sections in this report and Timber Specialist report (Thornburgh 2017).

Social and economic conditions impact: Carter, Harding, Madison, Meagher, Powder River, Park, and Sweet Grass county growth polices all cited timber as important to their local economies. The growing

populations around the forest may increase demand for forest products such as firewood, Christmas trees, berries, and mushrooms.

Income (Payments in Lieu of Taxes, Secure Rural Schools, Induced Income, Including Recreation, Timber, Grazing, etc.)

For more information on this benefit see the Income and Employment section in this existing condition section of this report.

Jobs (and Induced Jobs, Including Recreation, Timber, Grazing, etc.):

For more information on this benefit see the Income and Employment section in this existing condition section of this report.

Mineral and Energy Resources

Description of the benefit: The exploration, development, and mining of mineral resources within the Custer Gallatin National Forest provides significant employment to local and regional residents. Direct employment associated with both of Stillwater Mining Company's operating platinum and palladium mines is reported as ranging from 1,300 to 1,600 employees or subcontractors. Effects to indirect employment is typically projected at three times more than direct hires. More broadly, utilization of minerals produced on the Custer Gallatin National Forest serves to benefit the national clean air interest through the use of palladium in the automotive industry.

The planning area additionally provides benefits to people and contributes to the quality of life within and surrounding the planning area due to the scenic wonders associated with mountains, alpine landscapes, and prairie vistas. The geologic conditions currently present within the Custer Gallatin National Forest provide reliable clean water necessary to support a variety of lifestyles and interest. Topographic diversity in both montane and prairie ecosystems provide a diversity of habitats utilized by both flora and fauna within the area. The richness of the landscape is typically directly influenced by geologic process which shaped it. Appreciation and use of these unique landscapes through recreational activities has increased during the last decade and are expected to continue to increase in the future. The surrounding local economies benefit as a result of this increased recreational use of the Custer Gallatin.

Development of mineral material from quarries and pits located on the Custer Gallatin is used to maintain and construct new roads, develop recreation sites, trail heads and other facilities. Access and parking for hunting, outfitting, camping, and other recreation activities is a critical component of public use and enjoyment of the public lands. Without passable roads, the forest would not be accessible to the public, forest staff, and forest contractors.

For more information on this benefit see the Renewable and Nonrenewable Energy and Mineral Resource report (Pierson 2017.).

Social and economic conditions impact**:** Carbon, Carter, Harding, Madison, Meagher, Park, Powder River, and Sweet Grass county growth polices all cited mineral extraction as important to their local economies. Specifically, Big-Horn, Park, and Powder River cited coal extraction as important. Carbon, Carter, Harding, Powder River, and Sweet Grass cited oil extraction as important. The 2016 Rural Montana survey (Muste 2016) data showed that 9.9 percent of respondents thought federal lands should be managed to increase economic development from oil, gas, and mining. Eighty-one percent of

respondents were concerned about the possibility of toxic mine waste or other waste leaking into Montana's water sources.

Oil, gas, and mineral development has the potential to create boom towns, which have been linked to increased crime, higher levels of income inequality and decreases in social cohesion (Smith et al. 2001). Careful consideration of future oil, gas, and mineral development near Carbon, Park, Powder River, and Rosebud should include take elevated rates of income inequality and violent crime into account. These counties may be particularly vulnerable to the negative impacts of boom towns as they already have elevated levels of income inequality and violent crime.

Other impacts: Greenhouse gas emissions have been identified by the Environmental Protection Agency as a danger to human health. Emissions that result from oil, gas, and mineral development may impact human health. Global economic forces, commodity prices, and the changing needs or desires of society at large to produce and use these products may impact the mining of mineral resources located on the Forest.

For more detailed information on mineral resources on the Custer Gallatin, please refer to the Minerals Resource chapter.

Preservation of Historic, Cultural, Tribal or Archeological Sites, Caves and Paleolithic Features:

Description of the benefit: Intact cultural landscapes on the Custer Gallatin National Forest provide a sense of place and continuity that can enhance the quality of life and well-being for the public, especially for those communities that rely on the Custer Gallatin for their lifeway and income. Cultural resources have been found to provide inspiration, and personal, even spiritual, experiences. The tangible evidence of past activities such as fasting and eagle trapping, mining town locations, and historic inscriptions have provided awe-inspiring experiences.

Cultural site touring and visitation are growing activities within the planning area. Tourists are attracted by the nature and significance of historic properties and by the character of traditional communities, a character maintained by resources and uses of the Custer Gallatin National Forest. Adaptive reuse of historic buildings into recreation cabin rentals and educational centers promote both tourism and preservation of these irreplaceable resources. Interpreted sites like the Main Boulder Station afford an opportunity to educate the public about the history of the Custer Gallatin National Forest and the region. Furthermore, cultural resources on the Custer Gallatin can make scientific contributions to our society by expanding our knowledge and understanding of history and culture, and by connecting us to our collective heritage.

The planning area is within the aboriginal territories of a number of present day Tribes, including the Great Sioux Nation, the Three Affiliated Tribes, Fort Peck Tribes, Northern Cheyenne, the Crow, The Arikara, the Shoshoni, the Arapahoe, the Shoshone Bannock, the Nez Perce, the Confederated Salish Kootenai, and the Nez Perce band of the Umatilla. Many of the Tribes retain reserved treaty rights within the planning area to use these lands for traditional purposes. Activities such as the right to hunt and gather on unoccupied lands outside of the present day reservation boundaries are examples of these reserved rights, including the collection of traditionally used plant materials such as teepee poles and medicines, and certain hunting rights (for example, bison hunting outside Yellowstone Park). The Forest Service is charged with implementing programs and activities honoring Indian treaty rights and fulfilling legally mandated trust responsibilities to the extent that they are determined applicable to National Forest System lands (Forest Service Manual 1563).

For more information on this benefit see the Cultural Resources report (LaPoint and Bergstrom 2017.).

Social and economic conditions impact: Carbon, Carter, Harding, Gallatin, Madison, Meagher, Park, and Powder River county growth polices all cited preservation of one (or more) of following as important to residents and/or their local economies: cultural landscapes, history, archeological and geological sites, sacred lands, and caves.

Grazing

Description of the benefit: Agriculture and livestock grazing is a critical economic sector for many central and eastern counties surrounding the Forest. From 1970 to 2014, farm income (including livestock) dropped in the multi-county region nearly 36 percent. Comparatively, non-farm income increased 242 percent over that same period. The total multi-county region economy around the Custer Gallatin National Forest maintains an average of 4 percent employment in agriculture and 3 percent earnings from agriculture. Livestock-related cash receipts across the region dropped from a peak of $1.6 billion in 1973 down to a long term trend hovering around $600 million. Livestock receipts have rebounded to around $1.2 billion in the last three years. Demand for future permitted grazing is expected to increase but not at the same rate as demand for other services including recreation (see the Economics section of the assessment).

While neither the overall national beef cow herd nor the national beef supply is greatly dependent upon public rangelands, many individual ranching operations and communities in the intermountain West are almost 100 percent dependent upon total annual or seasonal forage provided by publicly–owned rangeland. Further across the industry, nearly 20 percent of forage demand is met from federal land.

For more information on this benefit see the Permitted Livestock Grazing report (Reid 2017.).

Social and economic conditions impact: Carbon, Carter, Madison, Meagher, Gallatin, Park, Powder River, and Sweet Grass county growth polices all cited grazing as important to their local economies. Population growth may also lead to added pressure to develop open spaces, further limiting grazing opportunities on non-federal lands and increasing the importance of federal lands in maintaining a thriving agricultural industry. The 2016 Rural Montana survey (Muste 2016) data showed that 23.3 percent of respondents thought federal lands should be managed to increase economic development from farming and ranching.

Scenery

Description of the benefit: Scenery and recreation access are key benefits the Custer Gallatin National Forest provides. While communities across the forest landscape recreate on the Custer Gallatin, recreation is more prevalent in the western areas. Visits to the Gallatin and Bridger areas far out-weigh visits to the other three areas. Mountains, alpine landscapes, and prairie vistas contribute to the scenic nature of Forest. Appreciation and use of these unique landscapes through recreational activities has increased during the last decade and are expected to continue to increase in the future. The surrounding local economies benefit as a result of this increased recreational use of National Forest System lands.

The National Forest System lands within the Custer Gallatin National Forest represent extremely unique and thus valuable scenery when compared to surrounding landscape within each landscape character type that includes all land ownership. In the ecological section that includes the Henrys, Madison, Gallatin, Absaroka, Beartooth, Bridger, Bangtail and Crazy Mountain landscape areas of the Custer

Gallatin National Forest, roughly 36 percent of that National Forest System land is "Class A distinctive" scenery. In the ecological section that includes the Pryors, Ashland, and Sioux landscape areas, roughly 89 percent of the National Forest System land is "Class A distinctive" scenery

For more information on this benefit see the Scenery specialist report (Ruchman 2017).

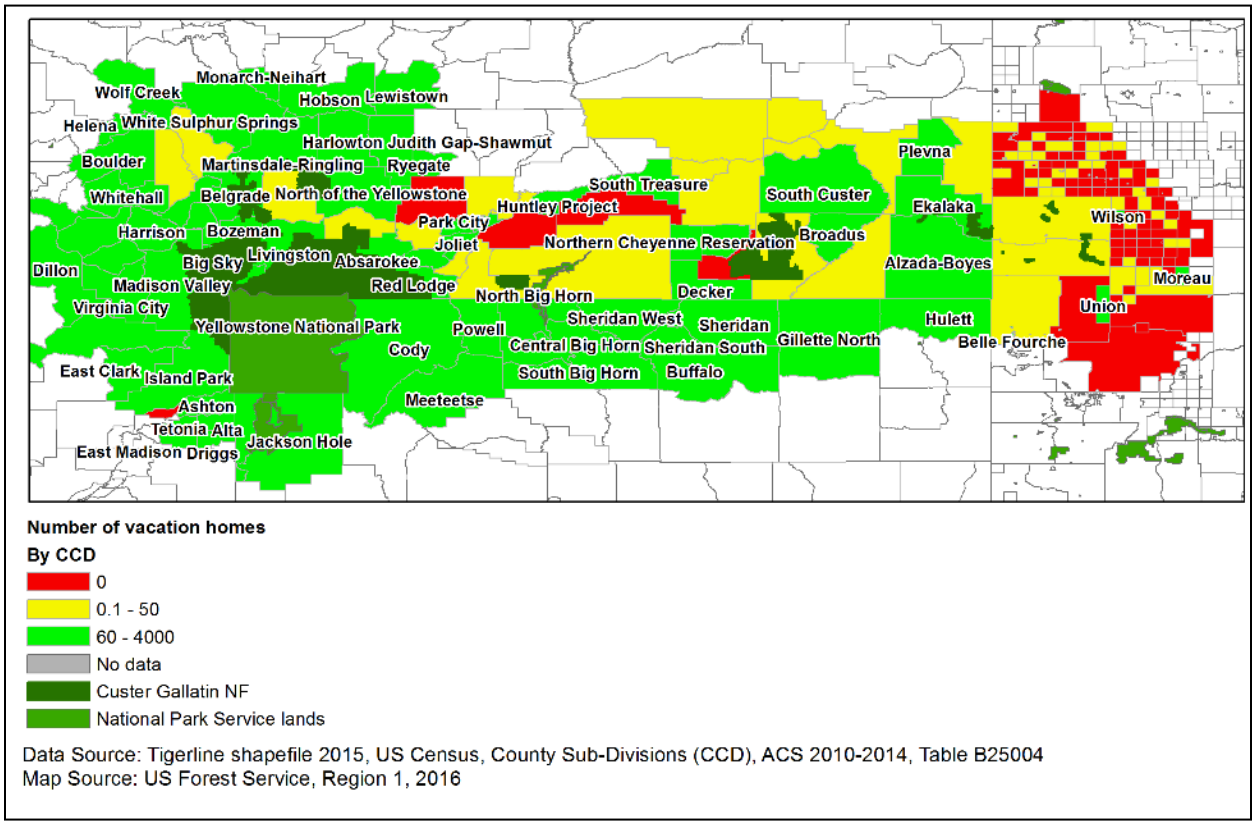

Figure 12. Number of vacation homes by community (2010-2014)

Social and economic conditions impact**:** Vacation homes are far more prevalent around the western areas of the Custer Gallatin and the Ashland district, signifying the importance of scenery and recreation to communities surrounding those areas of the forest. Figure 12 shows density of vacation homes by census district.

Recreation

Description of the benefit: Outdoor recreation helps add meaning to life, to gain stories and memories. Outdoor recreation helps people achieve goals, to learn new skills or knowledge, to test oneself, to enhance personal growth. It also helps create balance in one's life, reducing stress, as a recuperative activity, and to help one regain physical or mental health. Recreation provides stimulation: fun, excitement, adventure, the chance to do something different. Outdoor recreation helps underscore people's sense of belonging as they engage in recreation with family and friends.

Recreation is the Agency's single largest contributor to the economy by contributing over 13 billion dollars to the gross domestic product and producing more jobs than any other Forest Service program. The Northern Region's RHW programs are no exception. Recreation in region one contributes over $200

million to the regional market area; recreation on the Custer Gallatin represents $52,712,000 or 26% of that contribution.

In addition to economic benefits, RHW programs in the Region are deeply rooted in the way of life for local residents. We serve as community backdrops and backyards for daily recreation opportunities.

For more information on this benefit see the Settings, Opportunity and Access specialist report (Oswald 2017).

Social and economic conditions impact: Carbon, Gallatin, Madison, and Park county growth polices all cited preservation of scenery as important to residents and their local economies. Carbon, Carter, and Harding counties also cited access to recreation, in general, as important. Other counties listed specific recreation activities as important. Table 9 lists the county and relevant recreation activity cited in their growth policy.

Table 9. Recreation activity priorities by county (according to county growth policies)

Activity	County	Custer Gallatin National Forest Area
Mountain biking	Gallatin, Park, Sweet Grass	Gallatin, Bridger
Hiking	Carter, Park, Powder River, Sweet Grass	All areas
Cross country skiing	Park, Powder River, Sweet Grass	Gallatin, Bridger, Ashland District
Downhill skiing	Gallatin, Madison, Meagher	Gallatin, Bridger
Horseback riding	Carbon, Gallatin, Park, Powder River, Sweet Grass	Gallatin, Bridger, Pryor Mountains, Ashland District
Hunting and Fishing	Meagher	Crazy Mountains
River Rafting	Meagher	Crazy Mountains

Data Source: County growth policies for the following 11 counties: Madison, Meagher, Gallatin, Park, Sweet Grass, Stillwater, Carbon, Rosebud, Powder River, Carter (Montana) and Harding, SD.

The growing populations around the forest may increase demand for recreation access.

The 2016 Rural Montana survey (Muste 2016) data showed that 13.9 percent of respondents thought federal lands should be managed to increase recreation opportunities. Big Horn, Carbon, Madison, Rosebud, and Stillwater counties all rate in the bottom quartiles on access to exercise. Expanding opportunities for recreation could improve access to exercise in these counties.

Other impacts: Timber, oil, gas, and mineral development may impact access to recreation and scenery.

Beartooth Highway All-American Road

Description of the benefit: All-American Road recognition carries with it not only a heightened awareness of the highway route as one of the premier destination roads in the U.S. but also recognition of the agencies, organizations, and communities that sought designation.

All-American Road designation will help to expand the number and types of partnerships that are formed. These partnerships may extend beyond Montana or Wyoming. The designation serves to heighten local pride among communities situated at either end of the corridor and encourage the preservation of the many scenic, recreation, and historic resources that attract visitors.

All-American Road designation will help the Beartooth Highway receive a higher priority ranking for potential funds from Federal Highway Administration – National Scenic Byway discretionary funds and other funding sources. These funds could be used to enhance interpretive facilities, information kiosks, restroom facilities, and other needed byway improvements.

For more information on this benefit see the Existing Designated Areas report (Oswald 2017).

Risks and Stressors

External risks and stressors to the benefits (continued use and enjoyment of the Custer Gallatin National Forest) to people include population growth through migration, urbanization, and growth in travel and tourism. Additional concerns include climate-related impacts to resources and ecosystem services. On the western side of the Custer Gallatin National Forest, significant population growth is a very likely reality up through 2030 (Gallatin County Planning Department). Managing people, their direct use of the Custer Gallatin, and their demand for a diverse array of benefits will remain a challenge for Custer Gallatin National Forest managers. On the eastern side of the Custer Gallatin, population growth will occur in smaller communities, along with shifting demographics which will increase community sensitivities to land management activities and the importance of economic and social benefits described in this report. Environmental justice risks also exist on the Custer Gallatin National Forest and are detailed in this report. Finally, climate shift is also a concern where the availability of provisioning and other ecosystem functions may be altered, such as those that yield water, air, food, and important species of plants and animals.

Key Findings

Many communities around the Custer Gallatin National Forest are growing and are projected to continue to grow in the coming decades. There continues to be a high demand for both urban and rural lifestyles. Although populations are increasing in urban areas, they are also increasing in some rural areas as well, suggesting the demand for forest benefits from multiple use resources (for example, mining, grazing, and forest products) and ecosystem services such as scenery will continue to grow into the coming decades.

In both the economic and social areas of influence, there are many communities with higher concentrations of older populations close to Custer Gallatin National Forest boundaries. In the short term, demand for benefits important to these subpopulations will remain important. These benefits may include access, developed recreation, traditional use values, and others.

There are also many younger, urban communities around the Custer Gallatin, which are more likely to hold distanced, preservationist values and prefer less developed recreation. Given the diversity of communities in the social and economic areas of influence, Custer Gallatin National Forest managers will need to balance a broad range of values and interests.

There are also high minority and high poverty communities in the social and economic areas of influence. Special attention must be given to these populations during the planning process to mitigate potential social or economic harm to these vulnerable communities. Where appropriate and feasible, opportunities to sustain or even increase benefits to these communities should be considered.

Assessment of economic conditions shows that a diverse range of income and employment levels and opportunities exist across the Custer Gallatin National Forest. Most noticeably, high unemployment and poverty levels are observed in Big horn County, directly between the Gallatin and Custer, west and east

side of the Custer Gallatin National Forest. Economic diversity is divided not only by urban and rural areas, but also by geographic areas east and west. Recreation and travel economic activity are significantly more prevalent and important in the West, where scenery, amenities, and recreation uses are integral to surrounding culture, real estate, migration, travel, and recreation spending. In the central and eastern part of the Custer Gallatin, traditional industries and multiple use resource (for example, minerals, forest products, grazing) remain critical for community prosperity and social and economic sustainability.

Custer Gallatin planners have the opportunity to make the new, consolidated forest plan more wide-ranging and consistent than the individual Custer and Gallatin Forest Plans and to recognize the role of the national forest in supporting local economies through commodity production, recreation and tourism.

Literature Cited:

Carter County, Montana. http://www.cartercountymt.info/

CBI, January 2015. "Big Horn County Economic Development Plan". http://www.bighorncountywy.gov/images/downloads/BHC-Economic.pdf

County Health Rankings and Roadmaps. 2015. University of Wisconsin, Population Health Institute. http://www.countyhealthrankings.org/

Council on Environmental Quality (CEQ). 1997. Environmental justice guidance under the National Environmental Policy Act. http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQEJGuidance.pdf

Cossett, May 2014. "Big Horn County Growth Policy" http://www.bighorncountymt.gov/wp-content/uploads/2015/05/GROWTH-POLICY-Big-Horn-County-MAY-2014-PDF.pdf

CTA, March 2015. "Carbon County Growth Policy 2015". http://co.carbon.mt.us/wp-content/uploads/2016/01/Carbon_Growth_-Policy_-Final_3-2-15.pdf

Ecosystem Management Coordination, May 2016. "Website Analysis Methods Guide: The Estimated Economic Contributions of National Forests and Grasslands." http://fsweb.wo.fs.fed.us/economic_contribution/documents/WebsiteAnalysisMethodsGuide20160505.pdf

Gallatin County Department of Planning and Community Development. http://gallatincomt.virtualtownhall.net/Public_Documents/gallatincomt_plandept/planning

Headwaters Economics. 2016. Economic Profile System. (sources: Census Bureau ACS, USGS, NASA, BEA, BLS) (http://headwaterseconomics.org/tools/economic-profile-system/tech-info)

Kline, J.D. and Mazzotta, M.J. 2012. Evaluating tradeoffs among ecosystem services in the 1081 management of public lands. Gen. Tech. Rep. PNWGTR-865. Portland, OR: U.S. 1082 Department of Agriculture, Forest Service, Pacific Northwest Research Station. 48

Klinenberg, Eric. (2002). Heat Wave: A Social Autopsy of Disaster in Chicago. Chicago, IL: University of Chicago Press.

Madison County Comprehensive Plan: A Plan to Guide Future Growth and Development, 2010. http://www.madisoncountync.org/downloads/zoning/Madison_County_Comprehensive_Plan.pdf

Meagher County Growth Policy Plan, 2014. http://www.meaghercounty.mt.gov/mc_boards/Meagher%20County%20Growth%20Policy%20Plan%20draft1.pdf

METI Corp/Economic Insights of Colorado, LLC. 2010. "USDA Forest Service Protocols for Delineation of Economic Impact Analysis Areas."

Muste, Christopher. 2016. Rural West Conference Montana Survey. University of Montana.

Nature Watch, Interpretation and Conservation Education (NICE). 2016. Custer Gallatin National Forest Accomplishments. Accessed April,1, 2016.

OEDP, Stillwater Economic Development Plan, 2015. https://www.stillwatercountymt.gov/sites/default/files/files/EconomicDevelopment/Committee/14-oedp_final_july062016_digitalviewing.pdf

Park County Growth Policy, Park County Montana, 2016. http://www.parkcounty.org/uploads/files/pages/36/Draft-Growth-Policy-11-17-16.pdf

Powder River County Growth Policy and Land Use Plan, 2015. http://www.cgwg.org/wp-content/uploads/2015/12/Powder-River-Co-Growth-Policy.pdf

Rasch, Rebecca. 2016. "Income Inequality and Urban Vulnerability to Flood Hazard in Brazil." Social Science Quarterly.

Romero-Lankao, Patricia, Hua Qin and Mercy Borbor-Cordova (2013), "Exploration of health risks related to air pollution and temperature in three Latin American cities", Social Science & Medicine. Vol 83, pages 110–118.

Rosebud County, Montana. http://www.rosebudmontana.com/

Smith, Michael D., Richard S. Krannich, and Lori M. Hunter. 2001. "Growth, decline, stability, and disruption: A longitudinal analysis of social Well-Being in four western rural communities*." Rural Sociology 66.3 (2001): 425-450.

Sweet Grass County Growth Policy Plan, 2009. http://sweetgrasscountygov.com/wp-content/uploads/2014/03/Sweet-Grass-County-Growth-Policy-Plan-Adopted-2009.pdf

Teel, T. L., Dayer, A. A., Manfredo, M. J., & Bright, A. D. (2005). Regional results from the Research project entitled "Wildlife Values in the West." (Project Rep. No. 58). Project Report for the Western Association of Fish and Wildlife Agencies. Fort Collins, CO: Colorado State University, Human Dimensions in Natural Resources Unit.

USDA Forest Service. 2017. Job and Income Contributions, At-A-Glance Reports www.fs.fed.us/emc/economics/contributions/at-a-glance.shtml

Warziniack, Travis and Megan Lawson. Effects of climatic change on ecosystem services. In Halofsky, J.E.; Peterson, D.L.; Hoang, L., eds. Climate change vulnerability and adaptation in the Northern Rocky Mountains. Gen. Tech. Rep. RMRS-GTR-xxx. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. In press.

Wilkinson, Richard and Kate Pickett. (2010). The Spirit Level: Why Equality is Better for Everyone. London, UK: Penguin Books.

Winter, Patricia, Jonathan W. Long, and Susan Charnley. 2014. Section 9-Social/Economic/Cultural Components. In Long, Jonathan W.; Quinn-Davidson, Lenya N.; Skinner, Carl N., eds. Science synthesis to support socioecological resilience in the Sierra Nevada and southern Cascade

Range. Gen. Tech. Rep. PSW-GTR-247. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

Specialist Literature Cited:

Barndt, S. 2017. Custer Gallatin Assessment Plan Specialist Report - Climate.

Barndt, S., K. Reid, and J. Chaffin. 2017. Custer Gallatin Assessment Plan Specialist Report - Aquatic and Riparian Ecosystems

Dixon, B., et al. 2017. Custer Gallatin Assessment Plan Specialist Report - Wildlife.

Keck, T. et al. 2017. Custer Gallatin Assessment Plan Specialist Report - Soils.

Lamont, S. and K. Reid. 2017. Custer Gallatin Assessment Plan Specialist Report - Invasive Plants.

LaPoint, H. and M. Bergstrom 2017. Custer Gallatin Assessment Plan Specialist Report - Areas of Tribal Importance

LaPoint, H. and M. Bergstrom 2017. Custer Gallatin Assessment Plan Specialist Report - Cultural and Historic Resources and Uses.

Larson, J. and R. Rasch 2017. Custer Gallatin Assessment Plan Specialist Report - Social, ~~Cultural~~, and Economic Conditions

McMurray, J. 2017. Custer Gallatin Assessment Plan Specialist Report - Air Quality.

Nash, K. 2017. Custer Gallatin Assessment Plan Specialist Report - Land Status and Ownership, Use, and Access Patterns

Oswald, L. 2017. Custer Gallatin Assessment Plan Specialist Report - Recreation Settings, Opportunities and Access.

Oswald, L. 2017. Custer Gallatin Assessment Specialist Report – Existing Designated Areas.

Pierson, P. 2017. Custer Gallatin Assessment Plan Specialist Report - Renewable and Nonrenewable Energy and Mineral Resources.

Reid K. 2017. Custer Gallatin Assessment Specialist Report – Pryor Mountain Wild Horse Territory.

Reid K. 2017. Custer Gallatin Assessment Specialist Report – Research Natural Areas / Special Interest Areas.

Reid, K. 2017. Custer Gallatin Assessment Plan Specialist Report – Permitted Livestock Grazing.

Reid, K. 2017. Custer Gallatin Assessment Plan Specialist Report – Terrestrial Ecosystems; Nonforested.

Reid, K. 2017. Custer Gallatin Assessment Plan Specialist Report - At Risk and Potential Plant Species of Conservation Concern.

Ruchman, J. 2017. Custer Gallatin Assessment Plan Specialist Report - Scenery.

Sandbak, D. 2017. Custer Gallatin Assessment Plan Specialist Report – Baseline Assessment of Carbon Stocks.

Sandbak, D. 2017. Custer Gallatin Assessment Plan Specialist Report - Terrestrial Vegetation - Forested.

Shea, J. 2017. Custer Gallatin Assessment Plan Specialist Report – Drivers and Stressors -Fire.

Shimek, D. and J. Kempff 2017. Custer Gallatin Assessment Plan Specialist Report - Infrastructure.

Thornburgh, D. 2017. Custer Gallatin Assessment Plan Specialist Report - Timber.